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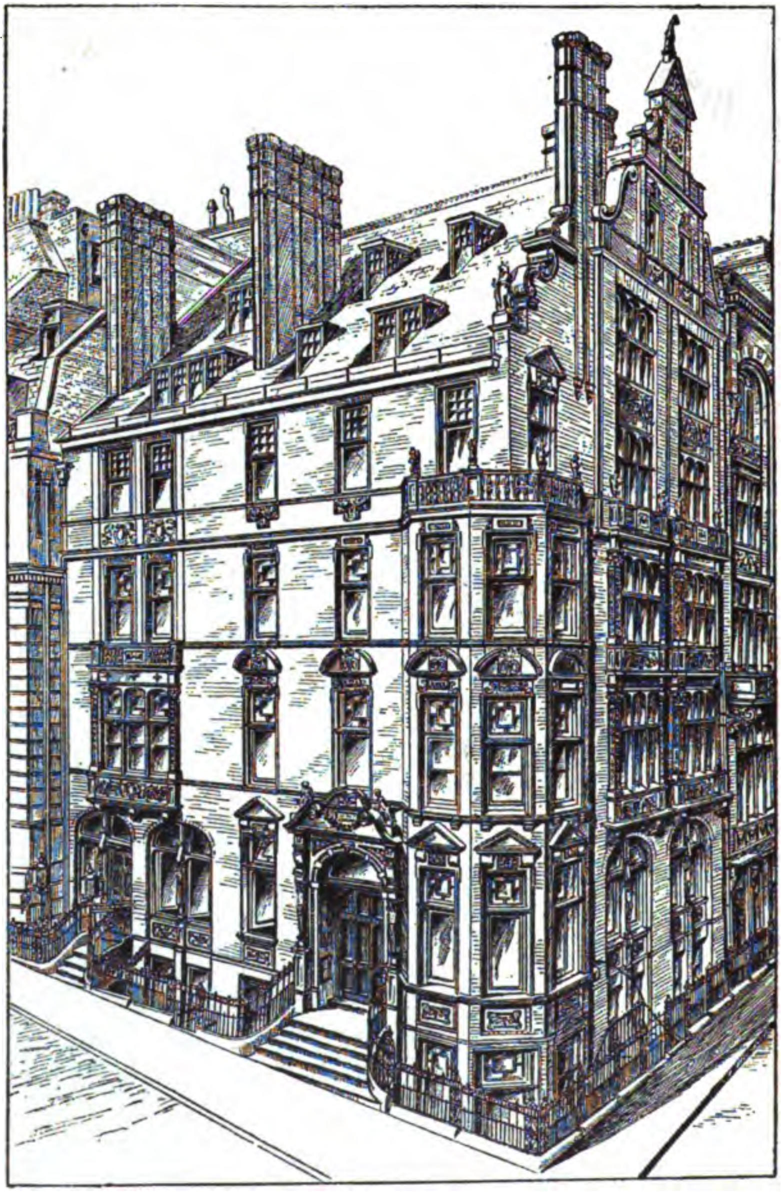

The Practitioner's New Building.

(See page 212.)

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ON CLIMATES SUITABLE FOR THE AGED.

BY SIR HERMANN WEBER, M.D., F.R.C.P.

CLIMATES influence different persons differently according to personal conditions, such as constitution, strength, morbid dispositions, mental peculiarities, temperament, and not least so age; different persons require, therefore, different climates. Roughly speaking, we might say that the growth and development of childhood up to adult age are most favourably influenced by marine climates, and that persons in the period of manhood are benefited by mountain as well as sea-climates, according to their individual constitutions, that good climates for both periods are those by which all the organs and tissues of the body are always kept at work—climates, like those of the British islands, with constant moderate variations of their different factors, especially temperature, humidity, light, electric condition, wind, and atmospheric pressure. The case is different with *old age*, the climatic management of which demands much more careful consideration, since the defects of old age are superadded to the requirements of constitution and morbid disposition.

The prominent peculiarities of old age are described by Dr. Parkes Weber in the "Physiology and Pathology of Old Age" (Clifford Allbutt and Rolleston's *System of Medicine*, Vol. I., 1906, p. 186). Those which are of special importance for our present task are changes in the system of circulation, diminished elasticity and activity of the small blood-vessels, and diminished force of the heart; the whole muscular system is reduced in size and power, and in consequence the creation of heat is diminished; the nervous system has lost much of its acuteness in perception and transmission. The supply of blood to the skin and the reactive power of the latter are diminished; under the influence of low temperature and abstraction of body heat, the extremities are apt to become cold from imperfect circulation, and, through this, not rarely congestion of the abdominal and other internal organs is set up. Most instructive, on this head, is Pasteur's experience that chicken become liable to the influence of the anthrax poison, if their temperature is sufficiently lowered by keeping their legs in cold water, while in their natural condition they are immune from this poison.

Persons weakened by old age not rarely suffer during the cold months from pneumonia, bronchitis, asthma, rheumatism, gout, gall-stones, and other biliary and digestive disturbances. The defective nutrition of old people in winter is occasionally shown by imperfect growth of their nails, and eruptions on the skin; and in two cases I have seen the development of hæmoglobulinuria during successive winters, while they escaped these troubles by wintering in warmer regions. In some old persons the intellect and memory are decidedly deteriorated by long-continued cold and cheerless weather. Mental depression, inability and disinclination to work, disturbance of sleep, often associated with constant drowsiness, are common in the aged during the cold, damp, windy, and dark days of the winter, especially in the large towns of England and other northern countries, and this mental depression exercises an injurious influence on the nutrition and functions of the entire body. Most of these morbid affections connected with senility, natural or premature, occur almost only during the winter months, and disappear in the brighter and warmer season.

In addition to, or rather as the effect of, the various defects mentioned of the aged organism, we may say that it is characterised by a great diminution of *resisting power*. The comparative freedom of disease during the period of full manhood depends to a great degree on this resisting power. While, in youth and the strength of manhood, the body is able to resist cold, damp, high winds, absence of light and sunshine, and the great and rapid changes of meteorological conditions frequently occurring during the colder months in northern regions, the aged body, through its want of adaptive power, is inclined to become troubled, under the influence of such meteorological conditions, with rheumatism, catarrhal affections, bronchitis, and pneumonia, the last of which is one of the frequent causes of death in old people.

Aged persons, therefore, who suffer from defective circulation and resisting power, ought to spend, if possible, the winter and early spring in climates where the demands on their weak resisting power are less great, where they find warmth, and sunshine, absence of, or shelter from, high and cold winds, mental exhilaration, the possibility of spending a great part of the day in the open air, and all this combined with pure air and water, good hygienic arrangements, satisfactory accommodation, and judicious medical advice.

There are no localities which entirely fulfil our demands; all of them have defects, all of them have periods during which the meteorological conditions are more or less trying to persons weakened by age or disease; at all of them there are occasionally bad winters; but at most, if not all, of the localities which we are going to mention, a judicious aged person can maintain his health more easily than at the majority of the localities of England, or the north or centre of the Continent, or North America, excepting a few favoured situations.

Egypt offers abundance of sunshine and warmth with only rare rainy days. Even the most aged person can spend almost the whole day in the open air. The mind is cheered not only by the sun and the beautiful sunrises and sunsets, but is also agreeably occupied by the remains of the oldest civilisation and art, and is amused by the habits and life of the Arabs, and of the visitors from many countries. It is to the desert that the climate of Egypt owes its characteristics; the air of the desert itself is dry, transparent, translucent, and aseptic; but at the health resorts in use part of the asepticity is lost, and the new system of irrigation is no advantage to the health of the visitors, though it is to agriculture. One can count, however, with some degree of certainty, on the continuance of a great number of fine days with the absence of drizzle and fog. Amongst the places best known, Helouan, near Cairo, and Assouan offer the greatest advantages, with regard to purity of air; Luxor, though less dry and aseptic, through the increase of inhabited and cultivated land, possesses many attractions; Mena House, near the Great Pyramids, suffers, during the first part of the winter, from the propinquity of the irrigated Delta, while it forms a satisfactory residence during the second half. Cairo is not yet hygienic enough to be called a good health resort, but gives food to the brain through the attractions of a truly eastern town. Aged persons, suffering from rheumatism, chronic bronchial catarrh, emphysema, gout, slight arterio-sclerosis, and albuminuria, are likely to be benefited by wintering in Egypt. The Nile voyage, on the usual Nile steamers, ought not to be taken by delicate persons on account of the frequent changes of temperature and currents of air in the different parts of the same steamer. Amongst the drawbacks of Egypt, however, we must mention the occasional occurrence of strong winds, charged with fine sand, which passes through windows and doors and every kind of clothing; and, further, the distance, the sea voyage, and rather considerable expense. In addition, we have the difficulty of finding good intermediate stations between the time of leaving Egypt —about the end of March—and returning to northerly homes— towards the end of May. The western Riviera, Corfu, and Abbazia, are, in our experience, the best intermediate stations.

Another region on the Mediterranean shore of Africa which offers advantages to aged invalids is Algeria, which is less dry and warm than Egypt, and has a certain number of rainy and windy days, but is fairly warm; the winter climate may be compared with the climatic conditions of England and northern Europe during late spring and early autumn. The accommodation at Mustapha supérieur is good, the beauty of the country is great, and the eastern life in the old town of Algiers is most attractive. On account of a sea voyage of rather more than 24 hours, Algiers can, however, not be recommended to the majority of really old people, but rather to those who wish to prevent premature senility.

The same may be said of Ajaccio in Corsica, where the air is still more humid than at Algiers, and, therefore, less suitable to sufferers from rheumatism, gout, and albuminuria; but the position and surroundings are wonderfully beautiful, and the sea voyage takes only about 16 hours.

Tangiers, on the coast of Morocco, has an agreeable climate, somewhat resembling Algiers, but the hygienic conditions and accommodation are less good, and the public safety is not yet thoroughly established. The sea voyage from Gibraltar is short, but the land journey to the latter place long. Mogador, on the north-west coast of Morocco, with a warm and equable climate, is for similar reasons still less fitted for persons of advanced age.

Madeira, the Canaries, and the Azores can only exceptionally be recommended to aged persons, unless they are perfect sailors, for the long sea voyage has had, in our experience, occasionally a very injurious influence.

Nearer home we have among the marine climates the Western and Eastern Rivieras, which, owing to the influence of the Mediterranean Sea, and the sheltering mountain range, have much warmer winters than other localities in the same latitude. The air of the Western Riviera, is, on the whole, drier than the Eastern, but at both the humidity varies considerably during different periods of the same day, especially on clear days, when towards sunset sudden falls of temperature and changes in the humidity occur, which demand on the part of the invalid great caution. Both Rivieras have also the disadvantage of great difference in the sun- and shade-temperature, and that at the north and south of the houses. Against these drawbacks the temperature during the winter months is about 8° F. to 10° F. higher than in London; the number of sunny days is about five times greater than in England, and the number of rainy days not half so great; fogs and mists are almost absent, and the cold winds to a great degree prevented or mitigated by the high mountain-barrier. In addition, we may remark that, during the months of the shortest daylight, the sun is 45 to 50 minutes longer out than in the latitude of London.

The principal health resorts at the Western Riviera are: Hyères, Costebelle, St. Raphael with Valescure, Grasse, Cannes with Cannet, Vence, Nice with Cimiez, Beaulieu, Eze, Monte Carlo, Mentone with Cap Martin and Gorbio, Bordighera, San Remo, and Alassio.

It would require much space it I were to enter on a description of the different places and the distinguishing features between them. They have been well described in the classical works of Dr. Henry Bennett, Dr. Theodore Williams, Dr. Marcet, Dr. Hill Hassall, and others. They have all more or less the climatic characters roughly traced above, and at all of them it is possible for aged invalids to find sheltered and cheerful resting places for the winter. They have all, it must be owned, greatly suffered from the terrible invasion by the motors, with their drawbacks of dust and noise and smell, for those residing, walking, and driving near the high roads, but some secluded paths can still be found. There are climatic differences according to nearness or distance from the sea, and according to greater or lesser elevation. On the whole, it may be said that the places close to the sea exercise a more exciting influence on the nervous system of susceptible persons than those farther inland, and cause to some, neuralgia and sleeplessness, and also that, at the same place, the houses close to the sea are different from those farther away. Still greater is the influence of elevation; thus, Cimiez is less exciting than Nice itself, Cannet less than Cannes, Gorbio less than Mentone; but the difference shows itself in the most striking way by comparing Grasse, the most elevated of the health resorts on the Riviera, 1,150 feet above sea-level (on the Boulevard Victoria), and about five miles distant from the sea, with Cannes, Nice, and the lower part of Mentone.

The temperature at Grasse is somewhat lower, the air is drier than at Cannes; the dews at Grasse are either absent or slight on the same mornings when they are heavy at Cannes; and, on many mornings when there is a thick haze or a kind of mist hanging over Cannes and Nice, the air at Grasse is perfectly clear. This greater dryness of air is probably the principal reason why many persons suffering from chronic rheumatic ailments are considerably benefited at Grasse, while the same persons had not been so favourably influenced at Cannes and Nice. Grasse has for this reason great advantages to aged people, because rheumatism is one of the most common affections with them. Another circumstance is, that the inclination and power to take active exercise is much greater at these elevated regions than in the lower localities.

The experience of most persons is that they can walk at least twice as much in the neighbourhood of Grasse without becoming fatigued than at Cannes, or Nice, or Mentone; that, for instance, a walk of an English mile, or of two miles at Cannes tires them and causes them to perspire, while at Grasse a walk of two to four miles produces an agreeable feeling of freshness. This is a matter of great importance to persons of advanced years, as exercise is one of the most powerful means of keeping up the nutrition of the muscles and maintaining the healthy condition of the heart and blood vessels, and, through this, to prevent senile decay and atrophy. We have thus an additional element towards the beneficial action of wintering at this elevated locality. Vence, situated at about the same elevation, exercises a similar influence on health as Grasse, but the beauty of the situation is not so great, and the accommodation more moderate, though still satisfactory, for modest demands. It has, as a set-off, the advantage of possessing more level, in fact nearly level walks.

At the Eastern Riviera the air is less dry than at the Western. The most sheltered localities, possessed of great beauty, are Rapallo, Santa Margherita, and Portofino, and nearly as sheltered, Nervi to the south and Pegli to the north of Genoa. Less shelter, owing to greater distance of and to some fissures in the mountain chain, we find at Chiavari, Sestri Levante, Spezia, Viareggio, and Pisa, the last being now separated by a stretch of land from the sea, but still possessing to some degree the characters of a marine place.

Amongst other localities which are greatly influenced by the Mediterranean sea, we may mention: Naples, Castellamare di Stabia, Sorrento, Amalfi, Capri, and Ischia; and Sicily, with Palermo, Acireale, Catania, Syracuse, Taormina, and Girgenti; but beautiful as they all are, and abounding in historical and archæological interest, none of them has quite as much shelter as the places on the Western and some of those on the Eastern Riviera, and, besides, the number of rainy days is greater; they, therefore, require greater resisting power and greater caution on the part of aged persons. The last remark applies still more forcibly to Rome, where the aged find too much to interest them in matters of art and antiquity to attend sufficiently to their health.

On the Adriatic there are likewise some good localities, especially the delightful Abbazia, the favourite winter resort of the Austro-Hungarians and neighbouring populations. Abbazia has the advantage of many sheltered and nearly level or gently rising walks. It much resembles in points of climate Rapallo and Portofino, but is a few degrees less warm, so that the lemon, orange, and even the olive do not thrive, the rosemary and mediterranean heath are stunted, while the laurel forms large groves.

On the Ionian Islands, several fairly good and interesting localities can be pointed out to aged persons still possessed of moderate resisting power, foremost amongst them Corfu, which offers special historical interest to the English, and is scarcely surpassed by any other place in the Mediterranean by the beauty of its walks and drives; but the shelter, especially from the north and north-east, is by no means perfect; the journey is long, and to most aged people the French and Italian Rivieras are preferable.

The various localities in Greece proper, interesting and delightful though they are to younger persons, do not possess sufficient shelter for those advanced in age, from the often prevalent high and cold winds, although the number of long-lived amongst the natives is rather considerable.

Amongst satisfactory places in the south-west of France, Pau deserves to be mentioned, though less warm than the Riviera, and also Arcachon, whilst Biarritz must be avoided by feeble, aged persons on account of the high and often cold winds.

The attractions of Florence, Venice, and Genoa ought not, as they often do, to tempt the aged to select them as their winter resorts, on account of the absence of shelter from cold winds.

The great advantages which the High Alps offer to younger people by their winter climates, ought not to induce those of advanced age to reside there during winter, since with them the small blood vessels of the brain are often inadequate to the increased strain, as I have repeatedly witnessed by the occurrence of apoplexy. The objections are not so great to sub-alpine places, especially Innsbruck, which, in addition to winter sports, offers many points of interest, Meran, Riva at the lake of Garda, and the more sheltered Arco, slightly to the east of it; but they cannot be said to offer the advantages of the Rivieras or Abbazia to persons requiring much shelter.

On the lake of Geneva, some localities offer rather fair climatic conditions during winter, especially Montreux, and the adjacent Territet, and Clarens, and the somewhat more exposed Vevey; but they are colder, less sheltered, more humid and rainy than the Western Riviera, and they are besides not free from mists. Higher up, about 3,200 feet above sea-level, Les Avants possesses a fine, cold, but sunny winter climate, is well sheltered from cold winds, is free from mists, easily accessible, and has good accommodation; aged people, who are still possessed of moderate resisting power and fair blood-vessels, are often benefited there between December and February. Caux, about 320 feet higher up, demands rather more resisting power.

During autumn and spring, but not during winter, the Italian lakes are suitable, as well as some of the sub-alpine places just mentioned.

The localities in the United Kingdom of Great Britain, which offer most advantages to the aged during the colder months of the year, are situated at the south-east, south, and south-west coasts of England and Ireland. We must confine ourselves to a rapid survey of the principal places. Folkestone and Eastbourne, being without proper shelter, cannot be regarded as winter resorts, but Hastings and St. Leonards have considerable protection from north-west, north, and north-east, and are suitable from October to January, while later on, with the prevalence of cold east winds, they can scarcely be recommended to the aged. Brighton and Worthing have not enough shelter during winter and spring, but during the late autumn months they can be used by such aged persons as will employ prudence and judgment in the selection of houses and walks. On the Isle of Wight, the Undercliff with Ventnor and St. Lawrence, and the adjacent Bonchurch, are sunny and fairly protected. Bournemouth, including Branksome and Boscombe, has the great advantage of beautiful pine woods, covering the hills to the north, east, and west. Sidmouth has deservedly come of late into greater favour, owing to its sunny, protected, and dry situation. At Salcombe the myrtle, orange, aloe, and other plants of southern regions, testify to some satisfactory climatic elements, but the ground for exercise is rather limited. Torquay maintains its old reputation for sheltered situation and comparative warmth, but the air is too humid for persons suffering from rheumatism. Budleigh Salterton, Exmouth, Dawlish, and Teignmouth possess likewise some advantages; and on the south-west coast of Cornwall, Falmouth, and Penzance are great favourites with many persons of advanced age, while the localities on the north of Cornwall are suitable to them only in summer.

The Channel Islands and the Scilly Islands, though endowed with comparatively high temperatures, are too windy to be recommended to the aged during winter and spring.

On the west coast, Clifton has often been useful to old people, and not less so Llandudno, which receives good protection by the Great Orme's Head, and Pwllheli on the Bay of Cardigan.

On the Irish coasts, Queenstown, on the southern slope of the southern hill of the Cove of Cork, has combined with great beauty of scenery, a remarkably mild and equable, though rather humid, climate; and the same may be said of Glengariff, on a harbour rich in beauty, with singularly indented coast lines, running in from Bantry Bay.

The remarks hitherto made refer principally or entirely to the colder and more inclement parts of the year. There is little difficulty in finding suitable localities for the aged during the warmer months, either in Great Britain or abroad. The eastern parts of our island, as well at the seashore as inland, are on the whole drier and more bracing and rather better suited to the majority than the western parts; but in these, too, and on the north coasts of Cornwall and Devonshire, health can be found and improved by open-air life, moderate exercise, and by making good use of all the other opportunities. The seashores and mountains of Wales and Scotland and of Yorkshire and the lake districts abound in health-giving localities of great beauty.

On the Continent, too, there is much choice. The lower regions of Germany, France, Switzerland, and Italy are too hot in summer to be recommended, but the mountain regions of the Black Forest, the Thuringian and the Hartz mountains, the Fichtel-, Erz- and Riesengebirge are rich in bracing well-wooded health resorts. Those who desire places in more Alpine regions can find them in the Salzkammergut, in Styria, Carinthia, the Tyrol, the Swiss and Bavarian and French Alps, the Jura, the Auvergne, and the Pyrenees. Persons of advanced age, however, and their advisers ought always to consider carefully the condition of the heart and blood-vessels when residence in elevated regions is contemplated.

I cannot close this short paper without urging that aged persons ought to endeavour, wherever they are, abroad as well as in their own countries, to spend, if possible, the greater part of the day in the open air, walking, driving, sitting, or reclining; on cold days as well as on warm, provided with clothing and covering suitable to the meteorological conditions. If they cannot find sheltered places readily prepared, they must contrive artificial shelters by screens, protected revolving seats, etc. They further must try to keep the air of their rooms, by means of open windows, day and night, so pure as to resemble as much as possible the open air.

Further, I may add that those who are unable to leave their homes can do much for their health by using their energy and judgment in availing themselves of all the advantages which their surroundings offer, and avoiding as much as possible all the unfavourable influences and conditions; and finally, we must remind our aged friends, that climate cannot do everything, and that while they are abroad they must continue with the rules of health, by which they ought to be guided at home, that they continue their breathing and other gymnastic exercises, and practise great moderation in food, especially when, by bracing climatic influences, in elevated regions or at the seaside, their appetites become unusually increased.

HEALTH RESORTS AND CLIMATES FOR CHILDREN.

By J. WALTER CARR, M.D., F.R.C.P.,
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SPAS and special health resorts play a comparatively small part in the treatment of disease in early life. Gout and goutiness, chronic rheumatism, and osteo-arthritis; diseases of the liver, especially those due to gall-stones and to alcoholic excess; renal calculus; obesity; early degenerative lesions of the heart, arteries, and kidneys; sufferers from one or other of these conditions constitute the great majority of the patients, who year by year crowd the leading health resorts of this and other countries, and from none of these morbid conditions do children suffer frequently, if at all. On the other hand, to the growing tissues of a child, with his consequent tendency towards nutritional disorders and diseases, climate is a matter of vital importance. His whole future life and health may be profoundly modified by even a comparatively short stay in an unsuitable climate—witness the evil results of attempting to rear English children in a tropical country. Next, therefore, to proper and sufficient food, a good climate is *the* essential for the upbringing of children, especially if at all delicate. Even in the case of healthy children who have to live in towns, as the great majority in this country must necessarily do, a far higher standard of general health and of resistive power to the noxious influences of city life may be maintained by the right use of an annual holiday; so that it is of real practical importance to decide where this can be spent to the best advantage.

A few words, however, are called for in regard to those diseases of early life for which treatment in special climates or health resorts is necessary. In many instances the indications are identical with those for older patients; thus during convalescence from acute nephritis, and still more when the disease threatens to become chronic, the climatic treatment desirable differs in no respect from that for adults. Again, children suffering from pulmonary tuberculosis may be treated at sanatoria precisely as adults are, although it should always be remembered that the younger the patient the more rapid, as a rule, is the progress of the disease, the more likely is it to be disseminated, both in the lungs and in other parts of the body, and the less, therefore, is the probability of any permanent improvement. Certain conditions in early life call, however, for special consideration. Take, for instance, the not uncommon cases of children, who develop a more or less chronic bronchitis, or whose lungs do not clear up completely after an attack of broncho-pneumonia, particularly if following upon measles or whooping-cough. Such patients are in great danger of bronchiectasis, but a winter spent in a warm, equable, somewhat moist climate, such as that of the Canaries, Madeira, or Algiers, will often lead to complete recovery; sometimes even when many months have elapsed since the lung trouble started, and when it may appear to have become hopelessly chronic.

Children, suffering from chronic valvular disease of the heart, nearly always rheumatic in origin, require special care, partly to allow of the maintenance of compensation whilst the heart is subjected to the ever-increasing strain of growth, partly to prevent the recurrence of rheumatic attacks, with probably fresh cardiac mischief. Such patients need a dry, fairly bracing climate, where they can get on the level such exercise as they may safely take, and, above all, where they will be under no temptation to indulge in violent or competitive games. Experience shows that they almost invariably do badly at any place where they are allowed to mix and play freely with other children, especially with those physically fitter than themselves for active exercise. So far as climate is concerned, many of the English seaside resorts, especially in the winter those on the south coast, are suitable enough, but in the summer the aggregation of children in these places is disadvantageous, and a quieter inland district is preferable, as, for instance, Crowborough, Hindhead, Tunbridge Wells, or Malvern; care being taken that the child is not allowed to walk uphill except under strict supervision. High altitudes are quite unsuitable for these patients; Dr. E. P. Baumann has noted that, in the rarefied atmosphere of Johannesburg, about 6,000 feet above the sea, school boys show well-marked signs of cardiac strain and dilatation, especially after severe exercise, far more frequently than at lower levels.

The most important class of children, for whom special climatic treatment is required, is the large number included under the old term "scrofulous"; children, that is, with a proclivity to indolent inflammations of the mucous membranes or of the lymphatic glands, the latter of which readily become caseous, or actually suffering from tuberculous affections of the bones or joints. For such patients sea air is usually the best, particularly that of the coast resorts in the Isle of Thanet. On the French side of the Channel, Berck-sur-Mer has a similar climate and reputation, whilst, farther south, Arcachon is milder and more sheltered. A number of inland spas on the Continent cater more or less for children of this class: for instance, Kreuznach, Hall in Upper Austria, Kissingen, Soden near Frankfurt-am-Main, and many other saline springs. One of the most important is Uriage, situated in a pleasant open valley amid the mountains of Dauphiné, about eight miles from Grenoble. The action of the muriated sulphur waters here is described as comparable with that of sea baths. The season is from June to October, but July and August would probably be unpleasantly hot for English visitors, as the village is only 1,350 feet above sea level. In the summer certainly English children with a tuberculous tendency are likely to do better at bracing places in their own country, or occasionally at high mountain resorts in Switzerland, than at any Continental spas, the waters of which, whether used internally or externally, are to be regarded mainly as useful substitutes for the sea, when the latter by reason of distance is practically inaccessible for children.

The special reputation commonly attached, at least in this country, to sea air for children is probably largely due to the undoubted benefits it confers on these scrofulous patients. They should, if possible, be educated at the seaside, the greater amount of sunshine there during the winter months being also an important factor. Merely for a summer holiday, however, for fairly healthy children, with no special lymphatic or tuberculous tendency, it is probable that sea air has little if any advantage over that of the country, especially that of an open upland district, and the same applies, at least in summer and autumn, to children convalescing from the infectious fevers. The essentials are, plenty of fresh air both by day and by night, good sanitation, including an unimpeachable water supply, and attention to the ordinary laws of health in regard to food, etc. The advantages of the country over the sea in the summer are by no means slight; first, there is the less risk of overcrowding, so many of our seaside resorts being really large towns, in which during the fashionable season families are forced to put up with accommodation often far inferior to that of their own homes, and in which the conditions of town life are to a large extent necessarily perpetuated. Secondly, in the country children escape the risks of catching infectious diseases from the many convalescents who are taken to the sea. Thirdly, they should be able to get all kinds of dairy produce, fruit, etc., more abundantly and cheaply; it is an interesting matter for speculation how the milk supply of a popular coast town is adjusted when the population is suddenly doubled in August! Fourthly, the opportunities for nature study are invaluable for children in the country, whilst, apart from those afforded by the beach, they are almost non-existent at the larger coast resorts. Fifthly, there is the question of expense; a stay of a week in the exiguous accommodation of a seaside lodging may cost as much as one of two or three weeks in the abundant space of a farm-house.

Certain precautions are of course necessary. The house selected must not be in a damp situation, or closely surrounded by hills or woods. For choice an elevated moorland district is to be preferred. There are many such in the north and west of this country, but even near London are numerous suitable localities on the plateaux and slopes of the North and South Downs and of the Chiltern Hills. The character of the water supply, often a weak point in rural districts, demands inquiry. In case of doubt the simplest and safest plan is to have all the drinking water boiled. Lastly, the sanitary arrangements call for investigation; but the primitive outdoor arrangements of a farm-house, though outwardly less æsthetic, may be safer and healthier than the more pretentious, but ofttimes defective, indoor closets in seaside lodging-houses. Subject to these precautions, there is no reason why many children should not have a longer, more enjoyable, and often more health-giving holiday in a farm-house, or, in the case of children from a lower social class, in a country cottage, than at a fashionable and overcrowded coast town.

CHANGE OF AIR IN YOUNG ADULT LIFE AND EARLY MIDDLE AGE.

By F. PARKES WEBER, M.A., M.D., F.R.C.P.,

Physician to the German Hospital, London, and the Mount Vernon Hospital for Consumption, Hampstead.

"CHANGE of air," "change of place," or simply "going for a holiday," has cured many complaints, both many in which a doctor's advice has been obtained, and many in which no medical man has been consulted. In the broader sense of the term the medical aspect of "change of air" would include the whole subject of medical climatology, but in this short note I shall confine myself to a group of cases in which, when a medical man is consulted, the selection of a place or region for "change of air," should be made chiefly on other grounds than those of its climate.

It is probably in brain-workers of the young adult period of life up to middle age, before degenerative changes have taken place, that the most rapid and satisfactory results are observed from simple change of air or "a holiday in the country." This is so well known that, when "run down," a change of air is regarded as the normal remedy, and is generally, where possible, obtained before seeing a doctor.

But because of special symptoms, or for other reasons, a doctor's advice is often sought in such cases, and the selection of a place or region for change of air has to be considered from medical and general practical points of view. Various questions of diagnosis may arise, such as the exclusion of incipient pulmonary tuberculosis, of functional and organic nervous diseases, of slight or commencing forms of insanity, and of bad habits (alcoholism). When all these have been so far as possible excluded, a place or region for the "change of air" or "holiday" has to be selected, and in nine cases out of ten this may be done practically irrespectively of special climatological considerations.

In order to explain this we must consider the factors which produce the beneficial effect in such cases and the symptoms previously complained of. The factors which produce the beneficial effect are, I believe:—(1) A more open-air life; (2) more muscular exercise (walking, etc.); (3) mental factors. In the vast majority of cases in which a simple "change of air" does good, all these factors play a part. The symptoms previously complained of include headaches, loss of appetite, disorders of sleep, lassitude, relative inability to do mental work, neuralgic pains in various parts, constipation, and (above all others) dyspeptic troubles. Amongst the most striking and uniform results of "change of air" in such cases are the removal of the dyspeptic troubles and "clearance of cobwebs" from the brain. Although, doubtless, all the factors mentioned above play very important parts in producing satisfactory results, I believe that the chief factor at work is the increased muscular exercise by up and down hill walking, climbing, open-air games, etc. Exercise increases the circulation of blood and lymph throughout the body, but, owing partly to necessarily accompanying increase of respiratory movements, a kind of gentle massage action is by this means brought to bear on the abdominal viscera, which during many kinds of exercise are intermittently squeezed by the contraction of the diaphragm and the muscular walls of the abdomen. Thus, many kinds of open-air exercise (*e.g.*, uphill walking, climbing, and rowing) specially favour the circulation in the abdominal viscera. It is, therefore, probable that open-air life in a hilly or mountainous country is at least to some extent preventive of cholelithiasis, a complaint notoriously favoured by sedentary habits and an indoor life.

Foremost amongst other disorders favoured by a sedentary life in town, I would place various gastro-intestinal troubles. That delayed or obstructed circulation in any part of the body does favour the occurrence of local trophic and functional disturbance in the part in question is evidenced by the familiar changes (cutaneous pigmentation and tendency to ulceration) seen in the legs of persons, who have varicose veins of the lower extremities, and is likewise illustrated by the gastro-intestinal troubles of persons with "organically" obstructed portal circulations, as in cirrhosis of the liver, disease of the mitral valves of the heart, and pulmonary emphysema. In the same way I believe that there is a fairly frequent condition of relative blood-stagnation and passive congestion of the gastro-intestinal mucous membranes (especially during young adult life to early middle age), which is not due to any organic change in the heart or in the blood-vessels of the lungs or liver, but which gives rise to, or favours, the development of various gastro-intestinal disorders, when it is not overcome by sufficient open-air exercise. Moreover, not only does open-air exercise favour proper oxygenation of the blood and tissues of the whole body, but it may well be supposed that muscular exercise plays an important part in processes of muscular metabolism besides those directly connected with the contraction of muscles, and that a healthy condition of the muscular system (such as can only be maintained by adequate exercise) helps largely to produce the subjective feeling of being in perfect health.

If all this be true, it may be urged that a daily open-air walk and regular exercise (with or without dumb-bells or other apparatus) in a room with the windows open constitute all that is required. In that way, however, other factors, especially the mental factors, in treatment by "change of air" would be wanting, and an equally serious objection is that the main class of patients, of whom I am speaking, are of an age when routine walks and gymnastic exercises are generally regarded as too dull and uninteresting, even could time be grudgingly found for them every day.

When, therefore, medical advice is sought for in these cases —and it may be asked for by the patient or his friends owing to fear of commencing consumption, threatened nervous breakdown, or in regard to various questions of medical diagnosis— the place or region for the holiday should be selected, not so much on purely climatological grounds as on account of its suitability for open-air exercise, according to the season of the year. A place should, if possible, be selected where the kind of exercise most congenial to the particular individual can be indulged in—be it games, such as lawn-tennis, golf, or cricket, or be it fishing, shooting, riding, hunting, climbing, sea-bathing, swimming, or cycling. In most cases, however, especially in spring, summer, and early autumn, nothing can excel walking exercise or walking tours in hilly country with beautiful and variegated scenery. For this purpose, suitable regions in abundance can be found both in the British Islands—notably in the mountainous regions of North Wales, the Lake District, the Derbyshire Peak District, many parts of Scotland, and many stretches of the English coast with high cliffs and chalk downs —and on the Continent, especially in the mountain ranges of Germany and in many parts of Switzerland. Germany is probably the land of all others for walking tours, the very paradise of walking tourists. Amongst regions more or less known to English tourists in this connection we need only instance the Black Forest, Thuringia, the Hartz Mountains, the German portion of the Vosges Mountains, the banks of the Rhine and the Moselle with their various adjoining hilly districts, and some other more remote parts of the German and Austrian Empires, such as the "Saxon Switzerland" and the Tyrol.

If it be said that in my remarks I have been suggesting medically-considered treatment for persons, who are not really very ill, but who simply require a holiday, I admit that there is some truth in the statement. But even if the question of treatment *per se* in most of these cases scarcely necessitates medical advice, a medical man is still often required because a diagnosis has first to be made; the diagnosis in the cases in question carries with it the advice of a holiday and the selection of a place or district for the change of air. Such treatment, even if does not involve much therapeutic skill, is preventive treatment, and prevention of an "organic" or "functional" breakdown at the outset or during the early stress of the active period of life is infinitely better than a cure.

Even with so simple a method of treatment as "change of air" and open-air exercise, there may be dangers. How often has not a chlorotic young woman been taken by her kind friends for an ordinary holiday in the country, and with more or less unsatisfactory results! Chlorosis is as frequent in many parts of the country as it is in London and other large towns, or even more frequent. When rest and chalybeate treatment are most needed, open-air exercise in the best climate in the world may lead to disastrous increase of the symptoms. It is almost as important to separate chlorotics from the class for which a mere holiday in the country can be recommended as it is to distinguish early cases of pulmonary tuberculosis.

In cases of various kinds in which the treatment advised, or part of the treatment advised, consists in a holiday with change of air or a visit to some particular health resort, it is not unusual, especially after everything has been seemingly arranged, to hear: "Is it absolutely necessary to take a holiday? For it is most inconvenient to have to leave my work now!"—or, "What will happen if I cannot leave London now?" What really happens in many cases when the advice is not carried out is that the patient soon begins to feel better. The reason for this is I believe not far to seek. Everybody has his "ups and downs" or longer "waves" of vital activity (evidenced by capacity for work, etc.), which may to some extent be compared to the shorter rhythmical daily waves of body temperature and waves of sleep, but, in many conditions of chronic ill-health, these (longer) waves of alternating vital depression and buoyancy, which normally should be scarcely noticeable, become exaggerated. Probably what usually occurs is that medical advice is sought during the period of greatest vital depression. Hence even if the treatment recommended be not carried out, the patient is often likely to begin to feel better soon after the consultation when the commencement of the period of relative buoyancy is due. Yet, if this view be correct, the disadvantage of putting off the treatment is obvious, even should there be no actual danger to life in doing so, for, the cause of the ill-health (*e.g.*, too continuous sedentary brain-work in town) not being got rid of, the mean level of vital power and health tends to sink or else the waves of depression tend to become still further exaggerated.

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THE TREATMENT OF PULMONARY TUBERCULOSIS.

By ARTHUR LATHAM, M.A., M.D., F.R.C.P.,

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Of recent years the advance in our knowledge of the treatment of this disease has been great. Before the advent of the sanatorium method of treatment, much faith was placed in the value of different climates in the treatment of consumption. We now know that the chief value of climatic treatment is the supply—the continuous supply—of pure fresh air. Cold climates give better results than tropical ones, and climates which are enervating to even healthy persons are of little value to those suffering from a debilitating disease such as tuberculosis. Again, exposure to strong winds, from whatever quarter, is harmful, as these increase the difficulty of respiration, accentuate the tendency to cough, and lead to a great loss of body temperature, which has to be made good by increased metabolism. High altitudes are of value to many persons, for the reason that the air is pure and stimulating. Many consumptives, however, are not benefited by high altitudes. Those who suffer from emphysema, extensive tuberculous disease, an irritable heart, a tendency to insomnia, or renal disease should never be sent to a higher altitude than 1,500 feet. Again, patients with disease of long standing, much expectoration, and extensive infiltration of the lungs would appear to do best in a climate with a considerable amount of humidity and almost at the sea level. Sea voyages were at one time freely recommended, and even at the present day are advised without due consideration of what a long sea voyage entails. Apart from the weakness likely to ensue from sea sickness, and the undoubted tendency consumptives have to hæmoptysis when at sea, and especially in the Red Sea, there are two fatal objections to a sea voyage. One is that even in the best boats the air below deck is impure. The other is that the food cannot meet the requirements of our patients. The practice of advising patients to become stewards on ships is absolutely wrong, and would never be followed by anyone who knew the conditions under which stewards have to live at sea. Patients are often advised, with a certain light-heartedness, to go to South Africa, Australia, or Canada. Such advice to persons with arrested disease, who have a definite idea of the conditions of the life they are going to, and a definite promise of employment, may be of service. Given to persons with active disease, who leave this country on a voyage of discovery, it cannot be too strongly condemned. I have received many letters from doctors in these countries stating that they have more consumptives than they can deal with, and begging me to do something to stop the practice of sending patients out of Great Britain in a hopeless stage of the disease. The practice is a useless and cruel one, and often results in the unfortunate people dying in hopeless poverty thousands of miles from their friends.

The question of climate in the treatment of consumption may be summed up as follows:—Arrest of the disease is possible in any climate in which the air is pure and bracing. When the disease has been arrested an after-cure in a special climate is often of value. As to particular localities, there is not space to say anything in this article, while the value of most places is discussed by other writers. The individual has to be considered; the life and the hotels, and I would add the doctors, of the place chosen should be known. Some patients require a quiet place and freedom from excitement and gaiety; others become introspective unless the conditions are congenial. In cases in which the disease has failed to undergo arrest after a prolonged trial, and in which there is much tendency to catarrh, a well-sheltered place, with an equable, rather humid climate, should be advised.

As has been said, the modern treatment of pulmonary tuberculosis, so far as climate is concerned, requires only that the air should be pure and bracing. The modern treatment of this disease also requires that the patient should be placed under the best natural conditions, and freed from the debilitating influences which are entailed by residence in a town. Again, the diet should be carefully chosen, so that the previous loss of weight should be made good, and the wastage following on active disease supplied. There is no object in pushing the amount of food unduly, and at the Frimley Sanatorium Dr. Paterson has obtained excellent results with a diet from which extra milk is excluded. Apart from attention to hygienic conditions and to diet, the treatment of the disease depends upon :—

(1) The limitation of auto-inoculation with the patient's tuberculous toxin.

(2) The utilisation of auto-inoculation, in carefully supervised doses, by means of graduated exercise or labour, to stimulate the production of anti-bodies, and so to produce active immunisation.[1]

(3) The utilisation of the various preparations of tuberculin to produce active immunisation, when auto-inoculation fails to induce a response, or fails to produce satisfactory results within a reasonable time.

The limitation of auto-inoculation can best be brought about by complete rest, and, when this fails, by the use of tuberculin and other remedies. Therefore, when active disease and fever are present, the patient must have the same absolute rest as a patient suffering from enteric fever. When auto-inoculation has become limited, the patient should be allowed to get up for gradually increasing periods, and then to take gentle exercise. There is great difficulty in persuading patients to avoid fatigue. Fatigue, or over-exertion, is the cause of death, or failure, in most cases of consumption. What causes fatigue also causes a greater absorption of toxin, and so leads to an extension of the disease. Patients, therefore, have to be under constant medical supervision. This can only be obtained, in the majority of instances, at a sanatorium. For this reason, and for the reason that a sanatorium is a school where the science of healthy living is taught, consumptive patients do best when treated in an institution of this kind. It is well, however, to remember that, because an institution is labelled a sanatorium, it is not necessarily an efficient school. Many sanatoria are a disgrace to the profession of medicine. No patient should be advised to go to a sanatorium unless the medical man giving the advice has recent knowledge of the institution, and, above all, of the character and attainments of the man at its head.

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[1] See *Graduated Labour in Pulmonary Tuberculosis*, by Dr. Marcus S. Paterson ; and *The Effect of Exercise on the Opsonic Index of Patients suffering from Pulmonary Tuberculosis*, by Dr. A. C. Inman ; *Lancet*, January, 25, 1908.

THE EVOLUTION OF THE PREVENTORIUM.

THE BRITISH POSITION.

BY WILLIAM EWART, M.D., F.R.C.P.,
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PREVENTION must ever take precedence over Cure. In the early sanatorium movement we attempted to reverse that order; but we have receded from our early ambition to cure confirmed consumptives by open-air sanatoria. Neither our climate nor our sanatorial methods are competent to deal rapidly with the large number of cases of phthisis on our hands. The original hope was that, by curing them all, we should make a definite impression upon the prevalence, and therefore upon the spread, of the disease. It was the recognition that the sanatorium had belied its name in connection with confirmed consumption that first opened the way towards a direct preventive policy.

Principiis obsta, a very old precept, gained increasing force from the test of results. It was held that the proper function of the institution was no longer to concern itself with the badly hit, but to help the mild or early cases only. This was the second and most responsible step. The sanatorium policy, in fact, aimed at arrest of the disease in the majority of the cases and the cure of the favoured few; arrest is another word for prevention of the worst developments. Prevention in that sense was therefore definitely brought into the programme.

The third stage is foreshadowed in the preceding one, of which it is the natural outcome. Its salient feature is the entire alteration in the class of cases deemed eligible for admission, and the increasing tendency to exclude all but those of the mildest type. In this country the tendency is still in that direction.

This policy has brought us to what must be the turning point in the evolution of the Preventorium. As it takes such mild cases to get the full working value out of the sanatoria, how much more profitable would it be to treat a slightly anterior stage, and to endeavour to prevent the occurrence of infection altogether. We are thus drifting towards a tardy recognition of elementary principles. Preventoria first, Sanatoria after. Preventoria to counteract the systematic child infection arising from those cases which the sanatoria refuse to admit. We shall long continue to need sanatoria as a charity for individuals, but our first need is for the effectual protection of the race. Prevention applied at the earliest age or from the earliest manifestation of a special liability to infection.

The policy of fighting tuberculosis with sanatoria alone would be tantamount to the admission that we are not aiming at the speedy termination of that scourge. We require in addition juvenile Preventoria where all the weaklings shall be fortified with sufficient health and strength, if necessary by repeated residences, to safely encounter the risks to which they now succumb. Sanatoria, by prolonging individual lives, keep them as a source of infection longer in our midst. Preventoria, by rendering the rising generation in large part tubercle-proof, would speedily so lessen the number of infected persons, that they might be provided for in the sanatoria till absolute cure was effected, or till death supervened. If this ideal were reached tubercle-dispersing persons would be safely isolated from the community, and epizootic infection could intercurrently be eliminated.

What is a juvenile Preventorium, and where should it be? These are questions which my limited space does not permit of discussing. There are spots by the sea, on the hills, on moors, which nature seems to have prepared for the purpose. Luxurious accommodation is not needed for those whose day is to be spent in the open air. The expense would be much less than that of sanatoria, for a much greater gain, and, quite apart from tuberculosis, the value to the state of the arrest in the deterioration of the race would baffle calculation.

To hasten the maturing of this scheme there is but one way—to educate the profession and through them the public. A properly organised Preventorium league could draw up an appeal that would secure the support of every medical man in these Isles. Let us hope that this article will lead to the formation of such a league.

SALINE TREATMENT OF SCROFULOUS LESIONS.

A GERMAN VIEW.

BY GEH. SANITÄTSRAT F. ENGELMANN, M.D.

MOST German clinicians have returned to the view that the "scrofulous diathesis" is a distinct entity. By the term we mean that tissue resistance to micro-organisms and their products is low. Since the tubercle bacillus is so widely diffused, and the results of its invasion are so disastrous, we have to deal with more scrofulous persons infected by it than by any other virus. It is not too much to say that probably the next epoch-making victory of medicine will be the elimination of tuberculosis, but clearly the decisive blow will not be struck until we know how to deal rapidly with its local manifestations, and to render the body practically immune. As a contribution to this problem, I propose to call attention to the methods of treatment of scrofula as they are employed, to the best of my belief with their highest potency, at Kreuznach.

Admitting and affirming that continuous open air must remain the sheet anchor of treatment, and that most patients will do well to spend the greater part of their time at marine or mountain stations, still, I hold that treatment on Kreuznach principles has a distinct value for which there is no other equally efficient substitute. At Kreuznach we have in summer warm but not depressing weather, and in consequence during the intervals between the active interferences small demands are made on patients' reserve force. Instead of, as in climatic stations, allowing a "stream of tendency" to operate slowly, we alternately stimulate and rest our patients according to their individual needs. First, to take the case of salt inhalation. Instead of, as at the seaside, trusting to the sea and land breezes to arrange this matter, we take our patients to halls where saline particles are present in a higher percentage than they ever can be at the seaside, and let them inhale this salt-laden air for a time that we ourselves govern. We then take them to the pulverisation apparatus, and judge of the appropriate dose of salt spray. Again, we assign the number of hours to be spent in the open air near the evaporating fences, and, when we wish to rest the patients from all saline influences, we simply place them in a healthy inland atmosphere. To come to the employment of salt by the mouth. We attach much importance to the use of saline water internally; for scrofulous children require an unusual amount of salt for the constitution and reconstitution of their tissues. We have for so many years used the Elizabeth Quelle, that we fully understand its dosage; whereas the oral use of diluted sea-water has not yet been placed on a scientific basis. With regard to the external application of saline materials, Kreuznach motherlye is of far higher potency than sea water.

To sum up from the clinical side. We hold that, in Kreuznach methods, we have a "Kur" which, because it is more intensive, is efficacious in a shorter space of time than any ordinary seaside treatment. Therefore it is indicated in the more serious scrofulous affections, such as inflammations of the glands, bones, joints, etc. Marine stations are better fitted for fortifying the whole system.

ORGANIC SALINE TREATMENT.

A FRENCH PROCEDURE.

FOR the treatment of tuberculosis and other wasting diseases, Dr. Quinton uses sea water by hypodermic injection. This is rendered isotonic with the blood by dilution with fresh water, and is then sterilised by passage through a Pasteur filter. Its character as an "organic serum" is lost after 14 days' storage or by heat sterilisation. The efficient dose is not less than 30 cc. every other day, and sometimes 300 cc. have been given every three days. No bad results have been observed by Dr. Quinton and his colleague, who, writing in *La Gazette des Hôpitaux*, summarise thus:—"We reserve our opinion as to the future of this treatment, of which the experimental duration has been too short. Our work now seems to show that, in most instances, the treatment benefits general nutrition and promotes sleep. In cases of tuberculosis, cough and expectoration are lessened, so that it may be used at least to retard the evolution of the disease."

CLIMATE AND THE NOSE.

By GREVILLE MACDONALD, M.D.,
Consulting Physician to King's College Hospital.

In many respects the influence of atmospheric and other environmental states upon the functions of the nose is peculiarly interesting. And correspondingly the influence of such states as part factors in the induction of pathological conditions is highly important. When it is realised that the nasal mucous membrane completely saturates the air, within the ordinary ranges of humidity and temperature, with aqueous vapour before the inhaled current reaches even the pharynx, the importance of the nasal functions will never be forgotten. The mechanism for regulating the supply of heat and water is found in the erectile tissue. The distribution of blood to the latter is thus arranged. The arterioles break up into capillaries in the usual way, and are gathered again into venous radicles, which in their turn open directly into the venous sinuses upon the fulness of which depends the degree of turgescence of the erectile tissue. Thus the blood pressure in these sinuses must be very low. When the arterioles contract, the flow of blood into the sinuses is arrested, and the sinuses are emptied by the elasticity of their surrounding membrane, though I have not discovered real elastic fibres in this membrane. On the contrary, when the arterial supply is increased, the pressure overcomes this elasticity, and the erectile tissue becomes turgid.

In the normal condition, which, perhaps, is but seldom found in cities, in dry cold air the turbinals, theoretically, should expand, so as to offer a larger area for the supply of water and heat, and no doubt, up to a certain point of variation, this does actually occur. At the same time, it is a matter of common experience that in very cold and dry mountain-air the nose-passages become exceptionally free, and the amount of moisture secreted exceeds what is needed for saturation. Probably so great is the depletion of the capillaries by the activity of the mucous glands that the blood supply is insufficient to induce erection: the warming area being also thus insufficient to raise the temperature of the nasal air to 98° F., by so much less is the water secreted vaporised. Other conditions, also, in high altitudes possibly frustrate the erection of the venous sinuses, such as the increased demand for oxygen and the deeper thorax-expansion necessitated by the attenuated air. For doubtless there is a subtle relation between the patency of the nasal fossæ and the demand for oxygen.

In a low state of the barometer, other than that induced by altitude, on the other hand, it is a matter of common experience that the nose becomes "stuffy." And in damp weather we find the turbinals erect when they should be partially empty.

Such common experiences at first sight appear to militate against the physiological theory. But it must be remembered that these sinuses afford, perhaps, the best objective evidence of the general state of the venous system. Anything favouring general engorgement of the veins, such as feeble heart action, chronic bronchitis, kidney disease, etc., will present a corresponding turgidity of the nasal erectile tissue; and brisk exercise will often, in a few minutes, remove the discomfort of difficult nose-breathing.

But beyond the physiological demands for increased blood supply to the nose and the general distribution of the blood, there are certain other points that are of considerable physiological and hence of practical importance. Thus light, apart from other influences, produces collapse of the erectile tissue, a point that all rhinologists must have observed when throwing a brilliant light into the fossæ. Smoke, again, has the same effect; and on a foggy day when London and its people are sicklied o'er with the pale cast of yellow dirt, every patient presenting himself in the Throat Department of the Hospital has an exaggerated degree of collapse in his erectile tissue. In conditions, too, of fear, the same effect is noticed; and a curiously common remark for a patient complaining of nose trouble is that since coming into the consulting room his nose has become much freer. This of course can be explained only by some change in the blood distribution.

The influence of smoke upon the nasal functions has a wider reaching interest. The intimate association between nose affections and asthma, however difficult it may be to explain, is now generally admitted; and the fact that a London fog has a beneficial effect upon some patients suffering ordinarily from over turgid erectile tissue, perhaps offers another link in the nasal asthma enigma. Many asthmatics are better in London than elsewhere; may this possibly be due to the effect of London smoke upon the inferior turbinals? The question at least is worthy of being asked.

But it is not only smoke that will relieve this turgescence of erectile tissue. Irritants of any kind produce the same effect if not too long continued. Even in the early stages of hay-fever the nose is often abnormally clear, though the control of the blood-supply quickly becomes exhausted, and obstruction, surmountable only by cocaine or adrenalin, is speedily induced. Snuff-taking doubtless is practised chiefly in the first place because of the relief it gives to nasal breathing. It is noteworthy, moreover, that the nasal treatment of asthma and hay-fever consists for the most part, except where structural disease necessitates operation, in the use of powerful irritants.

With such physiological and clinical facts before us it should not be difficult to advise patients with nose-disease as to the climate suitable to their cases. All cases of obstruction, whether they are due to hypertrophic conditions, or polypus, or malformations, are better in a dry atmosphere. Cases of excessive irritability of the pituitary membrane with paroxysmal sneezing and asthma, are generally worse at the sea and in windy places; they prefer dry, sheltered localities, and often do better in sandy soils among the pine trees. On the other hand, cases of atrophy and those where the flow of mucus is deficient, are distinctly better in moist localities.

Finally, it must be noted that olfaction is curiously susceptible to changes of climate. Many polypus-patients, who in London seem to have lost all sense of taste and smell, recover the sense very considerably in high altitudes, such as the Engadine, Davos, and other kindred places. But unfortunately the improvement seldom lasts when they return to the plains, the city, or the seashore. Possibly the absence of dust in the mountain altitudes contributes to their beneficial effect. But it must not be forgotten that the olfactory sense varies extraordinarily with the patient's general health, the state of his digestion, and even with his mental equilibrium.

THE EMS TREATMENT OF RESPIRATORY CATARRHS.

By ALBERT VOGLER, M.D.

Ems has multiform resources for treatment of diseases of the respiratory system. There are its water for baths and drinking, the wooded heights of the Malberg for the air cure, and Swedish movements for kinesitherapy, while milk preparations are given in suitable cases. Its reputation is based upon the co-operation of these various resources with the special procedures at the Inhalatoria, which it is the purpose of this article to briefly describe.

Taking as the first division of the subject inhalation in closed rooms; both small rooms for one person and large ones for the use of several are provided. They are filled with an infinitely fine pulverization of Ems water, generally mixed with vapour from a volatile oil, such as pine oil. Patients remain in these chambers for periods varying from half an hour to an hour and a half. Even in the large rooms there is no danger of the spread of infection. Any expectorated matter at once falls to the floor, and is fixed by the moisture there. It has been shown experimentally that the pulverised particles reach even the finest bronchioles. The advantage of this "passive" method is that the patient is submitted to the influence of a carefully selected agent for a considerable time, while breathing in the usual way, and avoiding all fatigue by sitting or reclining at will. These inhalations are, as might be supposed, used chiefly for catarrh of the finest tubes, especially where secretion is deficient or expectoration difficult. They are also employed for catarrhs of other parts of the air passages, often in conjunction with the other methods to be described later on.

(2) Active inhalations, direct from the apparatus.—Of the forms of apparatus used, some were invented and others perfected at Ems. To briefly describe those most employed; in the first, the "Schnitzler," the spray produced by the action of compressed air issues from a tube of about the diameter of a pencil, which is inserted into the nostril. It is

mounted with a joint, and any direction desired can be given to the jet. Other tubes are fitted over this when the spray is to be directed to the pharynx. The Schnitzler apparatus delivers a rather coarse spray, with considerable force if so desired; so that its action is largely mechanical and thermal, as well as medicinal. This is a spray of Ems water only, sometimes with added salts. As might be conjectured, it is of especial service when crusts or tenacious mucus are to be detached.

A finer spray, with a less forcible impact, is given by Goebel's "Unikum." In this the spray-conducting tube is surrounded by a secondary tube, which is bent so that it receives the first impact of the spray and breaks its force.

Another appliance—Lewin's—is employed chiefly for oral inhalation, generally given lukewarm. The spray is produced by the impact of a fine liquid jet upon a plate which is fixed, more or less horizontally, in an expanded glass cylinder. The resulting atomisation is so fine as to be almost vapour.

Other useful appliances are those of Heyer, Hässle, and Bulling. Their spray, also, is fine, but they are distinguished by their accurate and easily regulated means for graduating the temperature. These warmer inhalations are used chiefly in cases of dry catarrh.

The above are the principal forms oi the sprays employed at Ems. The patient makes use of whichever is prescribed once or twice a day, in *séances* each of from 5 to 20 minutes' duration. There are, in addition, various dry inhalations, in one of which is used an apparatus called "Thermo," which, by means of electric heating, produces vapours from volatile medicaments.

The only other inhalations requiring mention here are those of ligno-sulphite and oxygen. In the former, a solution of ligno-sulphite is allowed to trickle over fir branches, and the patient, sitting near, inhales the vapours thus encouraged to volatilise. It is used for diminishing excessive secretion in cases of chronic bronchitis. Oxygen inhalations have, up to the present, generally been regarded as palliatives; but their precise indications have not as yet been fully determined.

(3) Pneumatic Treatment. This is carried out either "actively" or "passively." Active treatment is given in an

open room with separate apparatus. It consists of the inhalation of compressed air, alone, or charged with sprays or vapours, or in exhaling into rarefied air. The two processes are, however, generally combined. The pressure can be regulated at will.

What is known as the passive treatment—in which the whole body is subjected to compressed air—is carried out in a pneumatic chamber, capable of holding about ten persons. The hygienic requirements of persons suffering, perhaps, from respiratory catarrh, who have to remain for a prescribed period with a number of others in a closed chamber, are fully satisfied by the modern principles on which these chambers at Ems are constructed. The pressure is generally raised by either 200 or 320 m.m. Hg. The duration of a *séance* is about 1½ hours, of which the first and last half hours are taken up in raising and lowering the pressure. There is telephonic communication with the outside, and a patient desiring for any reason to leave suddenly can do so without interrupting the others in their *séance*. To effect this, he passes into a small ante-room which is at the same pressure as the main room. When the door is closed behind, the pressure in the smaller room is rapidly lowered until the normal is reached.

Pneumatic treatment is used for cases of chronic bronchitis, asthma, and emphysema, and for the sequelæ of pleurisy and pneumonia. It diminishes secretion, and lessens congestion in the walls of the bronchial tubes, thus tending to effect their recanalisation, whether they were originally collapsed by plugging or by pressure from without. Active treatment also stretches the adhesions in old pleurisy, and in asthma and emphysema it serves as a form of pulmonary gymnastics. Cases have been reported in which subjective relief has followed passive treatment in pure spasmodic asthma. In these, any benefit received must have been due largely or wholly to suggestion.

SPA TREATMENT OF AFFECTIONS OF THE HEART.

By JAMES MACKENZIE, M.D.

THE result of spa treatment is usually written about by physicians who practise at spas. At first sight it would appear as if they were the only people who really could give a reliable account of such results. But this view, if carefully considered, is found to be not altogether correct. The physicians who practise there labour under considerable disadvantages. They rarely see patients in acute conditions, or during periods of extreme heart failure. Patients have to be so far recovered from any severe illness as to be able to undertake journeys, sometimes of a great distance, before they receive spa treatment. Those who have had a severe illness and are recovering may have been exhausted by the journey, and the spa physician sees them temporarily made worse. The treatment in such cases may be soon accompanied by a distinct improvement, due in a great measure to the rest, and to the continuation of natural recovery ; or patients at home may have been exhausted by the cares and worries of their duties, and a relief from these, coupled with a life under better hygienic conditions, may be at once followed by improvement.

If we carefully read the records of heart cases by spa physicians, particularly those who employ some special form of treatment, we shall almost invariably find that the writer attributes the recovery of his patient to that particular form of treatment. If a practitioner visits any spa renowned for special treatment for affections of the heart, he will at once be struck with the simplicity of many of the spa physicians and the trusting faith in their special methods. Patients are paraded as wonderful examples of the restorative effects of the spa and the special methods employed, whom at home the practitioner in his routine work has been accustomed to restore to health. The antecedent circumstances are rarely taken into account, and the spa physicians have often not enough experience of what can be done by other means. Therefore their account of the benefits of the "cure" lacks that comprehensiveness of knowledge which should enable them to estimate rightly and dispassionately the causes of the recoveries recorded.

This article is written from the point of view of one who, for over a quarter of a century, has yearly seen numbers of patients visit various spas and health resorts, who has for years followed the history of the individual patients, and who, by himself visiting certain of the spas, has endeavoured to estimate the value of the treatment in affections of the heart.

A very powerful influence can be exercised on the circulation by the immersion of the body in water; this may act in several ways, perhaps mainly by the action of the temperature. Great therapeutic efficacy is claimed for certain waters, but it is very doubtful if their ingredients have any effect upon the heart except from stimulation of the skin. In observing the results in patients who have returned from the various spas, I have seen nothing of their good effects to lead me to place hydrotherapy very high as a means of treating affections of the heart. The best results I have seen have been from bathing in the open sea. Where I have had patients with heart trouble who were fond of sea-bathing, I have allowed them to indulge in it, warning them to be honest with themselves, and to refrain if it brought on any sense of discomfort. In many cases the result has been extremely satisfactory, the whole system has been braced up, and they have returned from the holiday greatly benefited. Sea-bathing has after all only a limited sphere of usefulness, and doubtless many patients obtain great benefit from visiting the various spas, the supporters of each of which claim for its waters some special virtue. In order to assess the value of these claims, it is well to bear in mind by what process this benefit is obtained. The vast majority of persons go there as much for a holiday as for treatment. When patients are sent there, it is often because the individual has been busy with his affairs, and his heart complaint has been thereby aggravated; or, again, a patient is convalescent and a change of air, scenery, and mode of life is found beneficial. As the various spas cater for the more enjoyable side of existence, they attract large numbers of invalids who naturally desire the reputed benefits of the vaunted waters and drink them enthusiastically, or, if they cannot drink them, bathe in them. It will thus be seen that the benefits gained at such places arise from a variety of sources, and it is but human nature to attribute whatever improvement has accrued to the factors that most appeal to the imagination, such as hot gaseous waters from the bowels of the earth.

Every practitioner of experience will agree with me that a large proportion of heart cases return from their holiday greatly improved, and this is not limited to those who went to some particular spa, but also to all sorts of places, such as other spas, sea-side and mountain resorts, or who sailed on sea and lake, etc. It is manifest that the result thus obtained cannot be ascribed to the peculiar constituents of the waters of any single place. The fame of certain spas puts others into the shade, so that, at the latter, efforts are made to emulate the former by elaborating solutions that have some chemical resemblance to the waters of their more famous rivals. I think if an impartial scrutiny were made into the causes of some of these great reputations, the skill of the advertiser would be found more potent than the curative properties of the waters. If anyone wishes to investigate the Nauheim waters, he will have the greatest difficulty in finding wherein the healing quality lies. If he visits Nauheim and inquires into their properties, he will learn that every practitioner there resorts to accessory means; nor is there any agreement as to which of these means are of use. One says the waters are good when assisted by the massage and movements obtained by the machinery at the Zander Institute. Another derides the use of the Zander machinery and says the best effect is obtained from the baths combined with his specially invented exercises, while a third thinks the methods of the others are little avail, but considers the best results are obtained when to the baths something special is added, such as the electric current. Massage again is employed by many, but when all these methods and baths are of little avail every doctor prescribes in addition drugs of the digitalis group. It will thus be seen that so many complications are introduced that it is hopeless for an inquirer in a short visit to find out the value of the Nauheim waters.

Upon enquiring into the manner in which these baths act, it will be found that ten or twenty years ago, when the notion was prevalent that to have a good heart you must have a strong pulse, these baths had a remarkable effect in strengthening the pulse, raising the arterial pressure 20, 30, or 40 m.m. Hg. Nowadays the fashion being to soften a strong pulse, the waters are found to have a remarkable effect in lowering the arterial pressure. So wonderful are their virtues that it is claimed they can increase the pressure when it is low, and lower the pressure when it is high! Patients with low blood-pressure and high will be found indulging in exactly the same kind of bath. When the patients are examined it will be found that those who improve are just of the kind who would do so under similar treatment at any other spa with the water peculiar to the place.

In order to appreciate the manner in which spa treatment proves beneficial, it is best to consider what is the real nature of heart failure, and what are the principles essential to the restoration of the heart. The class of case which concerns us here is the chronic—as I have said, acute cases rarely experience spa treatment. In chronic affections of the heart, whether valvular or muscular, the weakness has been brought about because the heart muscle has become exhausted. The patient has, in all likelihood, been living the same life as people with healthy hearts, and trying to keep pace with them. The consequence is, that the impaired heart has not only had to do as much work as a healthy one, but has had to do it hampered by its own inherent defect, with the result that it does not get sufficient time to recover. The exhaustion, slight at first, gradually becomes more and more marked. The symptoms are ignored, until they become so distressing that the individual seeks advice. The treatment pursued may at first be the administration of "cardiac tonics," which in all likelihood have no effect. Then rest may be prescribed in addition. At home a man or woman with an active mind frets and fumes, and so is ordered away to this watering-place or that. The essential requisite in recovery in these cases is *rest*—the exhausted heart has to have its load made easier. With suitable rest, it begins to acquire gradually a greater and greater reserve force. With the accumulation of the reserve force, recovery takes place. The agencies employed during the process of recovery may be of the most varied description —drugs, baths, exercises, etc. The cure is attributed to these, whereas, if the actual circumstances are considered, they are but the tinsel and trappings—the real cure has been effected by rest.

There is an element which should be taken into consideration in every case, and that is the mental factor. The majority of people when told that there is something wrong with the heart become oppressed by the consciousness of their ailment. They may themselves be conscious of the heart trouble, as in the case of irregularity. The long pause, or the strong afterbeat, or the peculiar fluttering sensation, gives rise to much mental disquiet. If they have been told that they have a murmur, they in like manner become depressed. Unfortunately little has been done by the profession to ascertain the prognostic significance of many cardiac abnormalities, with the result that, when some trivial abnormality is present, both doctor and patient may take too grave a view of the condition.

Such patients will be found in great numbers at spas reputed for the healing virtues of their water. The belief in these waters being shared by the doctors resident there, they encourage the patient by telling what remarkable cures have been effected. The appeal to the mental factor goes a long way to cure the patient; just as another man, who understands the harmlessness of the symptoms, may almost cure the patient by assuring him of their triviality. Thus, by the intelligent perception of the nature of the complaint, and, by dealing with the mental element, cures can be effected.

Another factor that helps greatly in treatment is a quiet and contented mind. An individual who is restless, worried, and sleepless will never recover. If he can be freed from cares, then recovery will follow, if recovery is possible. Spa treatment is very beneficial in these cases. The patient is freed from domestic cares and business worries, the mind is pleasantly distracted by the surroundings. When an elaborate system of cure is carried out without fatigue, as by baths, massage, exercises, and so forth, the patient's mind is occupied, and the pomp and circumstance with which the "cure" is carried out, go a great way to comfort the mind, and brighten it with hope as to the issue of the treatment.

THE TREATMENT OF GOUT.

With special reference to Methods used at Wiesbaden.

By PROFESSOR W. WEINTRAUD, M.D.,
Physician to the Municipal Hospital, Wiesbaden.

THE treatment of gout at spas consists in the employment of remedies in general use elsewhere, in combination with those agents for the application of which special facilities exist at the particular spa selected. According to the modern conception, true gout is essentially due to a decrease in the functional activity of the cells of the organism upon which fermentative uricolysis depends; so that the foundation upon which treatment must rest is the attempt to increase such activity. This aim appears to be better served by the employment (in conjunction with rational diet) of the physical methods, which I am about to describe in outline, than in any other way.

Foremost in all treatment of gout is the use of baths. Gouty patients have always praised warm baths, on account of the relief to suffering afforded by their agency; some maintaining that the number of attacks is lessened, or that they run a shorter course, while others lay stress on the disappearance of local troubles left by a previous attack. However this may be, the fact that these patients so frequently return to a spa is sufficient proof of the value of the baths.

The classical method of their employment is the administration of warm or hot baths at from 95° to 104° F. Baths at this high temperature—of course, adapted to the constitution of the individual patient—should always be employed, unless some affection of the circulatory system (weakness of the heart, congestion of the head, arterio-sclerosis) suggests the use of "indifferent" baths, 91° to 95° F.; or unless, owing to weakness or irritability of the nervous system, cold-water treatment is indicated. The patient remains in the bath for at least a quarter to half an hour; even longer, up to three-quarters of an hour, if local gouty deposits and stiffened joints call for it. The object of the bath is, in the first place, heat-accumulation. As this cannot be carried very far in the bath itself without a certain amount of risk, its continuance in bed immediately afterwards is of the greatest value. At the appropriate moment, regulation of the heat-economy is effected by an outbreak of sweat. The patient, therefore, goes back to bed directly after his bath, and remains there for at least 1 to 1½ hours. In Wiesbaden the arrangement of the bath-houses, making it possible for the patient to regain his bedroom directly, without exposing himself to a chill, conduces to a most effective bath-course.

The question has often been raised as to why hot baths, which are of such positive benefit at the spa, lose their effect at home. It is extremely doubtful if the reason is to be found in the special ingredients of the hot springs. Certainly, the percentage of salts is not unimportant if the patient remains half an hour and longer in the bath, as either shrivelling or turgescence of the skin may ensue. A water like the Wiesbaden Kochbrunnen, isotonic with the blood, is consequently exactly what is required for a prolonged stay in the bath. Only the physical effects of the bath are to be taken into account. In so far as these consist of an introduction of heat, or in other words, a limitation of its loss, the arrangement of the bath-houses in Wiesbaden has advantages which are not usually found in the bath-rooms of private houses and general hospitals. The baths are walled and sunk in the earth. As the water from the spring is much too hot, the baths are filled in the evening for use the following day. During this time the water has warmed the walls of the bath, so that during the half-hour's use by the patient it retains the proper temperature. Another effective factor is their depth. Ordinary baths seldom have a greater depth of water than 15 to 16 inches; the tanks in the Wiesbaden bath-houses are often as much as 30 to 32 inches deep. They are much more roomy, containing three or four times the amount of the usual tub (about 220 gallons), so that the patient is able to move about quite freely in them. More important still is the buoyancy of the water, which is very great. In that way is brought about a relaxation of the muscles, and an alteration of pressure in the joints, so that the circulation in their capsules is directly acted upon; and as the limbs, by reason of the buoyancy of the water, lose their own weight, movements, even in diseased joints, are possible, and the pain is lessened.

The solution of the riddle, why bath-treatment is more effective at the spa than at home, is to be found in the factors mentioned. Radio-activity of the natural water has probably no share. Experiments with artificial addition of "emanations" have yielded me absolutely negative results. The significance of the action of the baths just described is to be found in the increased circulation of the blood, induced by a general heat-accumulation, but which is most marked at the periphery of the body, in the skin, and in all the limbs.

It is very doubtful whether the drinking of mineral waters has the same importance in the treatment of gout as baths. Strong alkaline waters must be prohibited, for the deposition of urates, and therefore gouty inflammation, is rather promoted than prevented by alkalies. The constant use of large amounts of fluids is, moreover, contra-indicated in many gouty patients out of regard for the circulatory system. The temporary use of a mineral water is quite another matter. For overloading of the circulation is prevented by the increased activity of skin, induced by balneological treatment, while the water, by its quick passage, washes out the cells of the body. Only a subordinate part can be assigned to the amount of salts contained in the water, but there must be enough present to allow large quantities to be taken without upsetting the stomach and bowels. This condition is met as well by the simple salt-springs as by the slightly alkaline waters and by the sulphate springs, but upon the peculiarities of the case depend which water shall be chosen. For uncomplicated cases and simple dyspepsia, Wiesbaden, Homburg, Vichy, and Neuenahr are sufficient; severe gastric catarrh and hepatic troubles require Marienbad and Carlsbad waters.

The amount of water taken in such a treatment must not be too small, unless contra-indications to copious use are present. The usual quantity is 8 to 10 ounces three or four times a day, the stomach being, so far as possible, empty. Most people bear large quantities of water better warm than cold, but there is nothing against it being taken cold all through the course; and all patients, in whom warm water causes constipation, may safely be allowed to drink it cold, provided that no gastric pains arise in consequence.

I consider the use of active and passive movements as essential in the treatment of gout at spas.

The simplest form of treatment by movements consists in long walks on roads with an easy gradient, because slight perspiration is induced, and thus the activity of the skin is increased. But, above all, a notable increase in the circulation of the blood is promoted, with a full and free passage through those parts of the body in which the products of cell-metabolism are not completely eliminated in men living in indolence.

Walking may be supplemented by chamber gymnastics, which in winter may largely replace pedestrian exercise. With suitably arranged pauses, chamber gymnastics can be carried out even with considerable weakness of the general constitution or of the heart. The fact that they can be continued regularly at home after completing the course at the spa makes them the most valuable of all known curative methods.

The course at Wiesbaden in the quiescent stage of uncomplicated gout follows these lines:—The patient has his bath at 7 a.m., or earlier, and stops in it from 20 minutes to half-hour, moving about in it freely, and drinking meanwhile 1 or 2 glasses of Kochbrunnen. After the bath he immediately gets into bed again, has his breakfast, and remains in bed for 1 to 1½ hours, to allow the sweating to continue. Then he gets up, and, after a rub down, does ten minutes' gymnastics while half-dressed. This done, he finishes dressing and goes off for his hour's (or hour-and-a-half's) walk, on returning from which he drinks a glassful of Kochbrunnen before taking the midday meal. After this meal, a rest not exceeding a quarter of an hour is taken, followed by a walk for two or three hours in the forests and on the mountains, with a spell for a cup of tea. Returning to the town a goblet of Kochbrunnen is taken before the evening meal.

In the hot season, the patient should drink his cup of Kochbrunnen at the spring between 6 a.m. and 7 a.m., and then go for an hour's walk before breakfast. Another hour's walk is taken after breakfast, and at 10 a.m. he bathes, resting in bed afterwards. The walk, in this way, is transferred to the early hours of the morning, when the forest is at its best.

The treatment described occupies from four to six weeks, and during this time twenty baths at least are taken. During the first week a daily bath is to be deprecated. Too many hot baths at the beginning of a course have been found to result in slight attacks of gout, and hence time, which should have been allotted to the course, is used up in getting well from them. In the first week a day's interval should elapse after every second bath, and in the second week after every third; in the third and fourth weeks four or five baths may be taken without a break.

The methods just described are suitable for patients, with otherwise healthy organs, undergoing the course of treatment after an acute attack of gout has subsided, so as to prevent recurrence. Obviously, the physician must make considerable modifications if plethora, arterio-sclerosis, anæmia, or nervous exhaustion complicates the case. Equally, of course, all organic diseases of the heart, liver, or kidneys have their appropriate indications. The procedure must, again, be different when a patient is brought to the spa still incapable of walking. In such a case, as in an acute attack, local treatment of the affected joints must not be neglected, while general massage will replace gymnastics.

Acute attacks of gout call for the immediate relief of pain by colchicine or salicylic preparations. Bier's "Stauung" unfortunately does not often effect the alleviating action for which it has been praised—even in combination with hot-air treatment, but hot fomentations are not on that account to be put aside. Only a few patients prefer ice-poultices to all others. The more quickly, by the use of anodynes, the patient regains the use of the affected limbs, the better, as a rule, the progress, and the less the after-effects in the affected limb. If puffiness round the joints and limitation of movements remain after the attack, local Fango-packing and hot-air treatment must be used, in addition to the baths, until freedom from pain permits the use of massage.

The general treatment described must be instituted, with due adaptations, at the earliest possible moment, experience proving that highly satisfactory results are obtained by the constant and regular use of such methods. But the mistaken idea must be abandoned, that a constitutional affection can be definitely eradicated by a course of treatment lasting for some four weeks.

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THE ZANDER METHOD OF TREATMENT.

By GUSTAV HAMEL, M.V.O., M.D.

WHAT are Zander Institutes? may be asked by readers unacquainted with Continental health resorts, save from descriptions in which there are frequent allusions to them. To this question I would gladly respond with a fuller account of the Zander machines and treatment than my limited space permits. It is to carry out this treatment—a mechanical adaptation of the system of exercises first introduced by Ling—that these institutes have been established throughout the Continent. In Germany they are found in all the larger cities and important health resorts, some of the latter granting them municipal aid. The machinery is also installed at some 50 of the European hospitals. Singularly enough, in England, London alone possesses a technically complete institute.

A muscle exercised on Ling-Zander principles may be compared to a sponge under hard pressure. With each contraction it discharges its venous blood and lymph to a greater extent than can be effected by ordinary exercise; so that we have here a differentiation of physiological action in favour of exercises by these systems. There are, however, disadvantages, inseparable from the human factor, in the Ling system, from which Zander's is free. A manipulator cannot be relied upon for the exact amount of resistance required; many passive movements cannot be given satisfactorily by hand, and some patients find the personal contact involved disagreeable.

The machines may be grouped in three classes:—(1) Those for resistance exercises, which have graduated levers and sliding weights, by which any degree of resistance may be obtained. To meet the physiological needs, this rises towards the middle of the movement and sinks towards its termination. (2) Machines for "passive" movements, such as rotation of the body or limbs, deep breathing, "horse riding," etc. (3) Those for vibrations, percussions, and other mechanical applications. In each class there are machines adapted for exercising separately any part of the body.

To touch briefly upon some of the special uses of the Zander machinery, the advantage of systematic exercises in treatment of heart weakness is now much insisted upon, and by these appliances the dosage can be accurately regulated.

Mechanical vibrations over the heart area are also useful, and, applied to the back, between the shoulder-blades, reduce the frequency of the pulse.

An important application of the machinery is as a substitute for general massage, including vibrations. The digestive organs provide great opportunities for mechano-therapeutics. Abdominal massage has long been employed, but abdominal exercises have received less attention. The Zander appliances afford a great variety of these, such as rotations of the body on different planes and movements sideways, forward, and backward; all of which can be performed with perfect ease, or with the exertion of any desired degree of strength. The passive exercises act at the same time as a kind of massage: pressing and rubbing the internal organs against each other and against the abdominal walls. "Horse-riding," often prescribed on the Zander machine, is an excellent general exercise, but not infrequently has a constipating effect, as have vibrations applied to the umbilical region. Applied to the lower lumbar region they stimulate peristalsis. Loss of co-ordination in tabes is treated by systematic exercises, by which separate muscles are re-educated in an orderly sequence and co-ordination then established between them. Vibratory treatment is used for neuralgia and chronic neuritis. It is interesting that, while vibrations in close contact with the body have a sedative effect, in interrupted contact (percussions) they are stimulating. There are appliances for systematic breathing exercises, which increase the capacity of the thorax and have many other applications. For accidental injuries, and in orthopædic cases, especially in those of spinal curvature, Zander treatment has such a wide range of utility that a separate treatise would be required for its description.

The system, to some extent, replaces ordinary exercise, and here it will appeal to those who have a distaste for the latter by temperament, or who wish for a maximum of exercise of a definite kind in a minimum of time; as well as to those who find satisfaction in observing a set ritual in all things. In England it is less likely to be used in this way than on the Continent; but it is well to note that muscles seldom called upon in ordinary sports are brought into play by the machines. Manual massage and exercises cannot be wholly dispensed with. In most Zander Institutes they are given in exceptional cases.

THE CONFIGURATION, METEOROLOGY, AND GENERAL HEALTH OF THE MIDLAND COUNTIES OF ENGLAND.

(A SHORT SUMMARY.)

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As might be expected, most marked differences in elevation are to be met with in the large area now under consideration. In Gloucestershire, on the estuary of the Severn, and again in the Fen district of Cambridgeshire, sea level is reached, and in the latter even surpassed. In the Peak district of Derbyshire, on the contrary, a height of nearly 2,000 feet is attained. Between these extremes all variations of altitude are encountered. With the exception, however, of the chief elevations mentioned above, the whole of the Midland district of England has an elevation of something less than 400 feet, which latter figure roughly represents the altitude of the high ground in the centre of the country, whence there is a gradual fall both east and west.

Corresponding with the varying elevations and exposures thus briefly sketched out, considerable differences in temperature, rainfall, mean relative humidity and so forth must be expected, and do actually occur in the various localities. Into the individual differences encountered at the several stations it is not our purpose here to enter; but it may be of interest to recapitulate shortly the most important characteristics of the climate of the Midland Counties, and to emphasise the points in which it differs from that of the sea-coast, upon which most of our best known health resorts are situated. Briefly the points of difference, as first pointed out by Mr. Campbell Bayard, are as follows:—

Owing to the absence of the equalising influence of the sea, the Midland and Inland Counties in general are both hotter in summer, and also colder in winter than the sea-coast stations. They show also for the same reason a slightly greater daily range of temperature, and owing to the fact that clouds tend to form inland, where the elevation is greater than on the sea coast, their average sunshine record is somewhat less. As regards rainfall, counties to the west, as is well known, receive a heavier, those to the east a lighter fall. To those living in London, the climate of which is altered by the artificial conditions inseparable from a great city, it may be of interest to add that the Midland Counties, though colder than London in winter, are with hardly an exception not so hot in summer.[1] The table printed on the next page shows the sunshine record for the 25 years 1881—1905 of various sea-coast and inland stations, the former being printed in *italics*.

GENERAL HEALTH.

Just as the climate at different places in the Midland Counties is somewhat modified by the varying local conditions, so the general health and liability to disease will depend to some extent also upon local differences in soil and protection, and varying meteorological conditions. Such differences are of local, rather than general interest, and cannot be further considered in this article.

Speaking generally, however, we may note that, as judged by the corrected Death-Rate, the general health of the Midland Counties in the last decennium, 1891–1900, has remained as satisfactory as in the preceding ten years. This is well brought out by a study of the statistics given in the invaluable supplements to the Registrar-General's *Annual Reports*, the last of which has recently been published.[2] From these it will be seen that of the Inland Counties, Staffordshire and Warwickshire, which contain large manufacturing and mining centres alone possess a death-rate higher than the average for England and Wales. All the others show a death-rate lower than the mean, Rutland and Huntingdonshire figuring honourably at the bottom of the list, with a rate of 12·54 and 13·07 respectively. This satisfactory condition of affairs is doubtless to be explained in great part by the fact that the Midland Counties constitute an area to a large extent rural in character, and that densely populated mining and manufacturing centres, wherein overcrowding with its attendant evils and diseases is so often rife, are but little represented.

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[1] For a consideration of the meteorological data upon which the above conclusions are based, as well as for a more extended study of the whole subject, reference should be made to the writer's article on "The Climate of the Midland Counties," in *Climates and Baths of Great Britain and Ireland*, Vol. II. London, 1902.

[2] *Supplement to the Sixty-Fifth Annual Report of the Registrar-General*, London, 1907.

TABLE SHOWING THE AVERAGE NUMBER OF HOURS OF BRIGHT SUNSHINE FOR THE WHOLE YEAR, TOGETHER WITH THE PERCENTAGES OF THE POSSIBLE DURATION IN EACH INSTANCE, FROM RECORDS EXTENDING OVER THE 25 YEARS, 1881–1905.[1]

——	Total Mean Annual Hours of Bright Sunshine.	Percentage of Possible Duration.
Jersey	1927	44
Hastings	1783	40
Falmouth	1766	40
Southampton	1665	38
Plymouth	1650	37
Pembroke	1642	37
Geldeston (Norfolk)	1621	37
Douglas	1600	36
Cambridge	1560	35
Cirencester	1508	34
Hillington (Norfolk)	1499	34
Oxford	1498	34
Kew	1467	33
Llandudno	1456	33
Marlborough	1396	32
Stonyhurst	1356	31
Durham	1317	30
York	1276	29
Worksop	1252	28
Bunhill Row	1140	26

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[1] From *The Weekly Weather Report of the Meteorological Office*, for the year 1906. Appendix III.

Turning to individual diseases, a word may be said with reference to the incidence of cancer and of phthisis.

As regards *cancer*, the death-rate of Huntingdonshire, Warwickshire, Cambridgeshire, Nottinghamshire, and Gloucestershire was above the average for England and Wales, while that of Huntingdonshire showed, as in the previous decade, the highest death-rate from this disease of any of the English counties (London alone excepted), and this in spite of the fact that its general health is so satisfactory. Whether we can still follow Havilland[1] and attribute this incidence to flooded rivers and damp subsoils is open to question. There have been, at any rate, considerable variations in the incidence of the disease throughout the various counties since his well-known work was written. The high cancer death-rate of London is in part at least to be explained by the numbers of imported cases dying within the walls of its numerous hospitals.

With reference to *phthisis*, the conclusions of Havilland in regard to the Midland Counties still *broadly speaking* hold good. Thus the death-rate for every Midland county (Warwickshire alone excepted) was in the last decennium below the average, while Rutlandshire again showed the lowest rate of any English county.

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[1] *The Geographical Distribution of Heart Disease and Dropsy, Cancer in Females and Phthisis in Females, in England and Wales*, by Alfred Havilland. London. 1875.

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THE CLIMATE AND HEALTH RESORTS OF THE SOUTH COAST.

By ALEXANDER G. R. FOULERTON, F.R.C.S., D.P.H. (Camb.),
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THE physical circumstances of the South Coast towns, generally, are such as afford the primary conditions which are essential for health resorts. The full southerly exposure of most of the seaside towns ensures the greatest possible amount of sunshine, whilst the Southdowns at the eastern end of the line and the highlands of Devon and Cornwall in the west provide good protection against the effects of cold northerly winds. Also, whatever may be its particular formation, the subsoil is of a dry nature from end to end of the littoral. Considered as a whole this coast presents a nicely graded climatological choice of locality, as one progresses from the eastern to the western extremity, from the markedly bracing Kentish and Sussex seaside towns to the milder and somewhat humid Cornish coast. But before considering the broad climatic characteristics of the coast it will be convenient to enumerate the principal health resorts.

At the extreme east we have Broadstairs and Ramsgate, both situated on the chalk and washed by the waters of the Downs. The two towns, Broadstairs with its full easterly exposure, and Ramsgate with a somewhat milder south-easterly aspect, belong climatologically to the East Coast rather than to the Channel resorts. Passing southwards, the next place on the Kentish coast to be mentioned is St. Margaret's Bay, which, because of its sheltered position, affords advantages to invalids who might be severely tried by the two other Kentish resorts. Beyond Dover we come to Folkestone, which climatologically may be considered as the most eastern of the typical South Coast towns as distinguished from Broadstairs and Ramsgate with their East Coast characteristics. This town, pleasantly situated on the dry warm Greensand and enjoying the equable Channel climate, has obtained a well-deserved reputation as a health resort. Next we have the neighbouring towns of Hastings and Bexhill, situated on dry warm formations belonging to the Ashdown Sands, with full southerly exposure, and well sheltered from northerly and easterly winds. Beyond Bexhill we come to a series of towns, situated on the chalk and happily placed between the South-downs and the sea, which, with their bracing but equable climate, their pleasant surroundings, and facility of access to them from the metropolis, have become the recognised resorts of the convalescing invalid from London. These towns include Eastbourne, with its dry and bracing south-easterly exposure; the quiet little town of Seaford, which, with its south-westerly exposure, is perhaps the best protected from the east wind of all these towns; and then Brighton, Hove, Worthing, Little-hampton, and Bognor—towns in which intelligent local sanitary administration has done all that is possible to improve the excellent health-environment provided by natural physical conditions. Leaving the Sussex coast, we come first, in Hampshire, to the pleasant sunny district of Hayling Island, which one feels might be made more of as a health resort. Off the mainland there is the Isle of Wight, a detached fragment of the geological formation on which are situated the healthy Sussex towns which have just been mentioned, with a climate ameliorated for the "chest" invalid by its insular circumstances. Returning to the mainland, one passes beyond the forest district of Hampshire to Bournemouth, situated on dry and sandy formations of the Upper Eocene stratum. In Dorset there is Swanage, situated on grits and sands of the Wealden Beds, with its easterly exposure tempered by climatic conditions incidental to its position halfway down the Channel. Beyond Swanage one comes to Weymouth and Melcombe Regis, the former part of the borough built on Coral Rag, the other on Oxford Clay: the climate here is bracing, but at the same time equable, an easterly exposure again being tempered by the warming influence of the western Channel water.

Amongst the many pleasant health resorts of the south coast of Devon may be specially mentioned Sidmouth, Teignmouth, and Torquay, the last with a climate particularly suitable for many cases of pulmonary tuberculosis. The south coast of Cornwall also affords a choice of several localities of special advantage in those chest cases in which mildness and equability of climate, with a certain degree of humidity of the atmosphere, are desirable; in which connection Falmouth and the coast between the Lizard and Land's End may be specially referred to.

It has been said already that Broadstairs and Ramsgate belong climatologically to the East rather than to the South Coast—a distinction readily appreciated when one considers the special influence of our eastern and southern waters respectively upon the climate of the coast. Off the East Coast the tide sets southwards towards Dover on the flood, and falls away northwards on the ebb; and so this coast is washed at every tide by waters coming down from colder latitudes. In the Channel, on the other hand, the tide makes eastward to Dover on the flood, and falls away westwards on the ebb; and our South Coast is brought under the influence of warm waters coming up from the South Atlantic. An important branch of the Gulf Stream impinges on the Scillies, and there divides into two smaller streams, one of which makes its way along the west coast of Cornwall, whilst the other ebbs and flows along the Channel, exerting an ameliorating influence on the coast line which it washes. This influence is manifested in various ways: in a general equability of climate, in a comparatively warm winter, and, towards the western end of the coast line, in the almost sub-tropical climate—with a comparatively heavy rainfall and general humidity of atmosphere—of the Cornish peninsula, whose shores on either side are washed by the Gulf Stream. Another way in which the warm Gulf Stream water influences the climate of the South Coast is by a gradual tempering of the east wind during its passage down Channel. The east wind, very dry after its passage over the Continent, takes up but little moisture from the cold waters of the North Sea, and when it first strikes our East Coast during the colder months of the year has qualities which are far from pleasant to the healthy, and are often actively injurious to the invalid. But as the east wind sweeps down the Channel it becomes warmed gradually, and takes up moisture from the more humid atmosphere, so that its unpleasant qualities are diminished in a noticeable degree. The temperature of the Channel water, then, being a dominating factor which has to be considered when studying the climatology of the coast, we find, as will be seen from the following figures, but small differences when comparing the mean annual temperatures of the sea water at various localities along the Channel. But if we take instead the mean monthly temperatures, we find that the extremes for particular localities are much farther apart at the eastern than at the western end of the Channel. Thus, taking the year 1904:—

	Mean Annual Temperature.			Mean Monthly Sea Temperatures.		
—	Mean Sea Temperature.	Mean Air Temperature.	Excess of Mean Sea Temperature over Mean Air Temperature.	Monthly Maximum.	Monthly Minimum.	Absolute Monthly Range.
Eastbourne -	52° F.	50·5° F.	1·5° F.	64·5° F.	41·5° F.	23° F.
Bournemouth	51·4° „	50·6° „	·8° „	63·5° „	41° „	22° „
Falmouth -	53·1° „	50·7° „	2·6° „	60·6° „	47·1° „	13° „

Taking a broad view, it may be said that the most important uses of the South Coast health resorts are in convalescence after acute disease, in recovery after surgical operations, and in the treatment of tubercular infections. The mild winter and generally equable climate of many of the towns also render them desirable places of permanent residence for those in the later and feebler stages of life, and for those with chronic disease of the lungs, heart, or kidneys. The Kent and Sussex towns, in particular, are especially suitable during convalescence from acute illness when the patient is normally of sound constitution, and when there is no reason to anticipate unfavourable sequelæ in the respiratory tract or in connection with the kidneys. The climate of the Kent and Sussex towns is of the greatest service also in the treatment of localised tubercular infections of the glands, bones, or joints. Some of the Sussex towns, again, are well suited to patients in the earliest stages of phthisis; but, in selecting a locality for cases of tuberculosis, one must remember that there are distinct gradations of climate amongst these more bracing towns, and that careful consideration may be necessary to ensure the proper climatic conditions for particular cases. For a robust child with gland infection, or for a favourable joint case, the climates of Ramsgate, Broadstairs, Folkestone, Eastbourne, Brighton, and Hove will suggest themselves. For a weakly child with tubercular joint disease, on the other hand, Hastings, Bexhill, Seaford, Worthing, Littlehampton, or Bognor will be better appropriate. Again, the climate of some of our Sussex towns can be utilised to advantage in the treatment of early cases of pulmonary tuberculosis; and open-air treatment can be carried out under very favourable conditions at Hastings, Bexhill, or Worthing. But whilst Eastbourne and Brighton, and perhaps the former especially, afford conditions under which children with tubercular gland or joint disease frequently make admirable progress to recovery, both places should be avoided for even very early cases of pulmonary tuberculosis; nor, indeed, can they be recommended in chest cases of any kind.

Another class of cases, to which the climate of the Kent and Sussex towns offers great advantage, includes those patients who come home from tropical climates either with general debility or convalescence after dysentery. For those who are suffering merely from what may be termed generally "want of tone" after five or six years' residence in India, climates such as those of Folkestone, Eastbourne, Brighton, or Hove are especially useful; whilst the somewhat softer climates prevailing at Hastings, Bexhill, and Worthing will be better adapted to the needs of those who are convalescent after more pronounced forms of tropical disease. In all these towns, moreover, the means of recreation and social occupation, which will be desired in such cases, are to be found.

Coming next to the westerly group of health resorts, those between the western border of Sussex and Land's End, we have a series of localities which are favourable in the treatment of certain classes of cases of a type different from those which have just been considered. Here the climatic conditions are such as are specially advantageous in the treatment of lung cases generally, in heart disease, and when the working powers of the kidneys are impaired. This portion of the coast is also most useful in convalescence after acute illness when affection of the lungs is to be feared as a sequel, and more especially, perhaps, for convalescent children of a naturally delicate type. It provides, moreover, many ideal places of permanent residence for those in the enfeeblement of old age.

The general principles of the climatic treatment of tubercular phthisis are dealt with elsewhere ; it may, however, be pointed out here that, whilst the climate of some of the Sussex towns is of excellent service in the earliest stages of pulmonary tuberculosis, there are no places where treatment of the more advanced stages of the disease can be carried out to greater advantage than at Ventnor, Bournemouth, Torquay, and Falmouth. For it is unfortunate that a vulgar prejudice, which favours some health resort with a foreign name, has led to the deportation, year by year, of so many phthisical patients whose cure or prolongment of life, as the case might be, would have been better assured within our own coast.

On the South Coast the sea-bathing season, except for the strong and healthy, must be regarded as limited in most years to the months of July, August, and (sometimes) the first half of September, this period corresponding roughly with that during which the mean day temperature of the inshore water is at or above 60° F., with the air temperature still higher. In connection with this, one cannot but comment upon a certain want of enterprise which has neglected the utilisation of what would be a most valuable asset for several of our South Coast towns—the provision of means for the systematic employment of warm brine baths. The value of such baths in suitable cases has been amply proved elsewhere, yet Sidmouth is, so far as I know, the only town along the South Coast which has added to its attractions as a health resort by providing the means of using them.

THE EAST COAST CLIMATE.

By J. T. C. NASH, M.D., D.P.H.

THE general direction of the east coast of England is north and south, with an eastern aspect; but it is so indented at the Thames Estuary and the Wash that, broadly speaking, from one-fourth to one-third of the total coast line between the North Foreland and the Tweed runs actually east and west, with a directly northern aspect. Thus we have a north coast of Kent, extending from the North Foreland to Sheerness at the mouth of the Thames, and a north coast of Norfolk, extending, roughly, from Cromer to the mouth of the Ouse.

From Whitby to Stockton-on-Tees, again, the coast line runs east and west more than north and south.

While Lowestoft, in east longitude 1·7°, marks the easternmost point in England, north of it the general slope of the coast-line is in a north-westerly direction, with so much of a westerly tendency from this point to Berwick that the latter town is situated in about 2° west longitude.

The latitude ranges from 51° at the North Foreland to 55° at Berwick. The mean annual rainfall on the east coast is low: 25 inches may be taken as a fairly approximate figure. In some places the average is barely 20 inches. The mean relative humidity is about 82. On the whole, the air of this coast is dry, promoting evaporation from both skin and lungs. This, in summer particularly, is aided by the long hours of sunshine, in which respect the coast south of the Humber is specially favoured. Taking the coast generally, the sunshine is about 34 per cent. of the possible, while some of the stations show a higher percentage.

In contrast to the south coast, which has a larger share of warm, moist winds, there is generally a bracing quality in the dry, cold east and north winds of the east coast.

In view of the fact that the presence of trees in any quantity tends to deprive the ground of the sun's heat and to make the days cooler, but the nights warmer, it should be noted that the health resorts under consideration are not generally characterised by much vegetation. Margate, in particular, owes some of its specific effects to the marked absence of any wooding in its vicinity.

Strange though it may seem, the isothermal lines of Great Britain indicate that in August the east coast is slightly warmer than the west at the same latitude. In winter, however, they show that the east is from 2 to 4 degrees colder than the Welsh, Devon, and Cornwall coasts. This is largely due to the Equatorial current, which especially warms the west coast in winter. Yet, in respect to latitude, even the east coast is benefited about 20° by proximity to the warmer waters of the Atlantic. Its mean annual temperature is about 49° F.; that of January, 39°; of July, 61°. Spring, as a rule, is cold and windy, but the early months of autumn are pleasant.

While it will be impossible to include every town or village which has claims as a health resort, I shall endeavour to sketch the salient and differentiating points of those mentioned, as far as I know them, and as far as space will permit.

The Isle of Thanet is most fortunately situated, and Margate at its north-east corner has been credited, in popular language, with "the best air in the world." Particularly stimulating it undoubtedly is, as the winds, save from the west, blow straight from the sea; those from the north coming over vast expanses of ocean and being virtually uncontaminated by contact with land for *thousands* of miles. Owing to the gentle slope of the sands there is excellent bathing in shallow water—a point of special importance for children. In the Cliftonville district, which is provided with good hotels and houses, visitors will not be incommoded by the excursionists who come in considerable numbers in August in quest of fresh air and amusement.

Conditions of general debility, cases of early phthisis, and almost all cases of scrofula and surgical tuberculosis do remarkably well at Margate. There is a difference of opinion as to its suitability for chronic bronchitis, but it may fairly be tried at any rate for the more robust of these invalids in the late spring, in summer, and in the early autumn. As a rule (subject to some exceptions), it may be said that cases that improve at Margate improve quickly. On the other hand, if the air should prove too stimulating, an early warning is given, and the physician had better recognise at once that in the particular case his selection has been faulty. When Dr. William Ewart's views gain acceptance, Margate may perhaps be known as the great British "Preventorium."

Westgate-on-Sea, two miles from Margate, is a sufficiently quiet resort. An irregular coast-line forms two small bays, one fronting north and the other almost west, sheltered by chalk cliffs from the east winds.

Southend is situated on the northern bank of the Thames Estuary, where the river widens into the open sea. It is one of the largest towns on the east coast. Old Southend is, in the season, overrun by excursionists, but Westcliff, of more recent growth, affords refuge from them. The Southend pier is said to be the longest in the kingdom, and is much frequented for sea-fishing, which may there be enjoyed, as on the Brigg, the natural rocky pier of Filey, without risk of sea-sickness. The town faces due south, and has above the average of sunshine. At Westcliff, the cliffs afford protection from the winds and enable invalids to sit out in the sunshine even in January.

Clacton, Frinton, and Walton-on-the-Naze all have bracing climates, but, facing south-east, are warmer than the opposite north coast of Kent. Clacton enjoys much sunshine, and is notable for its dryness. In the season it is subject to "tripper" invasion, but Frinton and Walton are quiet, while equally invigorating. East winds are somewhat prevalent at all three, but are least felt at Clacton, owing to its more southern aspect. Felixstowe, now an important watering-place, has much the same climatic conditions, and is also comparatively free from the excursionist element. Its air is not so keen as that of the opposite north-east coast of Kent, and the autumn and early winter are usually especially fine, still, and sunny.

Aldeburgh, Southwold, Lowestoft, and Yarmouth, facing due east, are eminently bracing, with very pure air. These four towns have the advantage of rivers and broads in their immediate neighbourhood. The rainfall at Lowestoft (average 24 inches per annum) is less than that over most of England and Wales, and in winter its sunshine record compares favourably with that of Bournemouth. Lowestoft, indeed, has ambitions as a winter resort. At Yarmouth, unfortunately, the ubiquitous tripper has taken the famous sands largely for his own; but compensation may be found in the splendid stretches at Hunstanton, Skegness, and elsewhere. Cromer, besides a reputation for beauty, also possesses a fine sea-beach, and enjoys abundance of sunshine, absence of fog, and dry, stimulating air. The country is beautifully wooded in its vicinity with oak and pine. While cold and subject to north-east winds in the spring, it is generally bright and warm in summer and notably mild in autumn and early winter.

Hunstanton actually faces due west, overlooking the Wash, and is considerably sheltered from the east winds. Its sandy soil and chalk subsoil ensure dryness. Delicate patients do well here, particularly those with respiratory affections. At Old Hunstanton, near by, there are excellent golf links. Skegness and Cleethorpes, in Lincolnshire, provide keen, dry, tonic air, and fine sands. Their disadvantages lie in the flat and unattractive nature of the country round them, and in the fact that, while the east winds spoil them for the spring, they are crowded with excursionists in the summer.

The fine bay at Bridlington Quay (the town of Bridlington, sometimes, I think, called Burlington, lies half a mile inland) affords good pleasure sailing, and its firm, dry, and shelving sands excellent sea-bathing. This, like most of the east coast resorts, will be found useful for convalescents.

Among the many natural attractions of Scarborough may be noted its proximity to the York wolds and moors, its picturesque situation, and its splendid sands. In the daytime, in summer, the climate, though warm, is bracing, and at night even chilly. It is windy, though protected to some extent on the north-west and the south.

Few places equal Whitby, in Yorkshire, for variety of scenery. The quaint town of old houses and narrow streets is itself built close down to the sea, but within three or four miles are the high and bracing moorlands, while in the neighbourhood are valleys of sheltered warmth. Even rheumatic patients may be sent here. In addition to the usual summer recreations of boating, sea-fishing, and golfing, later in the year fine salmon fishing may be had in the Esk.

THE ENGLISH SPAS CONSIDERED THERAPEUTICALLY.

By ARTHUR. P. LUFF, M.D., B.Sc., F.R.C.P.,
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THIS paper is limited to the consideration of the English spas from the therapeutical point of view, as the spas of Scotland and Wales are dealt with in other articles. Whilst fully recognising the value of many of the foreign spas, yet I feel confident that the English spas are too frequently neglected by medical men in this country. The advocacy of the virtues of a particular spa by a medical man, practising in that spa, is perhaps apt to carry with it the suspicion of a certain amount of bias; it is therefore, I think, of importance that physicians who, while not practising at any particular health resort, yet are frequently brought in contact with patients requiring spa treatment, should lose no legitimate opportunity of forcibly bringing home to their medical brethren the great advantages possessed by so many of our British spas, and of impressing upon them that, with the high state of efficiency to which our home spas have been raised, it is no longer essential to banish our patients to foreign health resorts. I wish to make it clear that, unless a complete change of environment is desired by our patients, or is essential to their recovery, treatment can, in the great majority of cases, be carried out as effectually in our own country as abroad. In some cases, of course, a complete change of country, climate, and surroundings is desirable, and such patients should be sent to a suitable spa or health resort abroad; on the other hand, one of the advantages of selecting a spa within our own country is the avoidance of a long and fatiguing journey, which is so apt in a person who is more or less an invalid to cause nervous exhaustion, and to render the patient unfit for the commencement of treatment on arrival at the spa. In bygone years it was somewhat of a reproach that the English spas were rather lacking in amusements and gaiety as compared with the majority of the Continental spas. This reproach does not now, however, hold good, as amusements and recreations are year by year being better provided for at our home health resorts.

Spa treatment is a complex treatment made up of several factors, and on the correct apportionment of these different factors depends much of the successful issue of the treatment. These several factors are (1) hydrotherapy, which includes the taking of, and the bathing in, the waters; (2) diet; (3) exercise; and (4) accessory forms of treatment, such as electric light baths, electrical treatment, massage, etc. With regard to the drinking of a water at a spa, there is a tendency with some medical men to consider that the efficacy of a natural mineral water is due solely to its watery constituent—in other words, that its one therapeutic use is that of a flushing agent. Even so astute a physician as the late Sir William Roberts appears to have held this view. In his Croonian lectures, referring to the employment of the waters of certain spas in the treatment of gout, he said: "Now there can be no reasonable doubt that the efficacy of these springs has nothing to do with their scanty mineral ingredients, but depends on their watery constituent. . . . . Their action would be to temporarily dilute the blood and lower its percentage of urates and sodium salts. This effect would tend to retard or prevent uratic precipitation, and thus give the defective kidneys additional time to overtake their arrears in the task of eliminating uric acid." If the efficacy of a natural mineral water depended solely on its watery constituent, I do not for one moment think that the resort of sufferers to the various natural springs would have successfully stood the test of centuries as it undoubtedly has. The fact is that, in judging of the effect of natural mineral waters, we have been too much under the domination of analytical chemistry, and our deductions from these results have been consequently biassed and cramped. The more I consider the therapeutic effects of the natural mineral waters, the more convinced I am that chemical analysis, although it can inform us what are the mineral constituents of the natural waters, is yet unable to determine exactly the state of the salts dissolved in them. The "ionic or electrical dissociation theory" and the existence of the mineral constituents of natural waters as "ions" are leading our thoughts to a new, and, I believe, correct appreciation of the therapeutic values of these waters.

Useful as may be the drinking of a water at a spa, yet equally, and even in some cases more useful, is the encouragement for therapeutic purposes of the functions of the skin by balneological methods. The skin is the largest organ of the body, and, as would be expected of such an organ, it possesses various and complex functions. Amongst its functions are: (1) The excretion of toxic bodies, the retention of which proves harmful and ultimately fatal to the organism; (2) the power that it possesses, through its nerve-endings, of stimulating distant organs and tissues; and (3) its heat-regulating power. The success of balneology, whether in the treatment of chronic joint conditions, of affections of the fibrous tissues, of certain heart and kidney affections, and of certain skin diseases, depends upon the recognition of the powerful aid which can be given by the skin in restoring the normal balance.

Heat, whether applied in the form of water baths or in that of air baths, lowers the arterial pressure and raises the venous pressure, as a consequence of the relaxation of the muscular coats of the arteries and of the arterioles that is induced. The flushing effect of a course of warm baths on the clogged periphery of the circulation is useful in many diseases, and this beneficial influence extends to the heart, since the opening up of the peripheral circulation eases the work of the left ventricle, which consequently is able to deliver its load more and more completely, and retain less and less residual blood as the peripheral resistance diminishes. The cabinet electric light bath, in which the whole body is enclosed up to the neck, is a powerful means for the reduction of the arterial pressure, and is serviceable in the treatment of high arterial pressure, such as that observed in granular kidney. In addition to its pronounced action on the circulation, it is a powerful stimulant of the cutaneous excretion of waste products. Warm baths are of great therapeutic value as vaso-motor relaxants, but there is another group of baths possessing quite different properties, namely, those of cardiac and vaso-motor stimulation. These are percussive baths, massage baths, and baths of alternating temperature.

Percussive baths are represented by the various forms of douche and needle baths. The general effect on the blood pressure is to raise the arterial and to lower the venous pressure. George Oliver states that the needle bath, doubly alternating in temperature (*i.e.*, falling from warm to cool, then rising to warm, and again falling to cool), with a hot descending spinal douche, has the most powerful effect in raising the arterial pressure. There is no doubt that the effect of the percussion of water on the peripheral vessels is greatly intensified by varying the temperature, and especially by allowing it to dip to the lowest ranges. Apart from percussion, the mere alteration of temperature, when considerable, has a remarkable effect on the blood pressure, and especially is this the case when the cold plunge is taken either after a very hot-water bath, or after a hot-air or Turkish bath. It is on this account that the subjects of advanced chronic gout, and of other diseases associated with high arterial tension, should avoid the cold plunge, and the cold needle bath or douche after a hot bath. As regards hydrotherapeutic treatment, our British spas are extremely well provided.

The following is a brief description of the various English spas (except Bath and Harrogate, which are described elsewhere), together with their respective therapeutic advantages.

BUXTON.

The water is warm (82° F.) and contains a considerable amount of free nitrogen ; 2 per cent. of the total gases consists of argon. In addition to the simple thermal water there are weak non-gaseous chalybeate waters. Altitude 1,000 feet. Buxton is situated in the Derbyshire Peak District, and is one of the most bracing of the British health-resorts. On account of the very small proportion of salts present in the water, it is an extremely beneficial water to employ with the object of removing gouty deposits, while the various forms of fibrositis and cases of chronic rheumatoid arthritis are well treated in the various baths. Douche-massage, vapour baths, hot air baths, electric light, and other baths are provided.

The spa is open all the year, but the season is from April to September.

CHELTENHAM.

The waters are cold. Altitude about 150 feet. Cheltenham is a flat town, sheltered from the east winds by the Cotswold Hills and possesses a comparatively dry atmosphere. The winters are mild, and the town is much used as a place of permanent residence by persons who have lived for a long time in hot climates. It is noted for its beautiful gardens, which have well earned for it the name of the "garden city of England." The waters are rich in sodium chloride and sodium sulphate; one of them contains, in addition, a large amount of magnesium sulphate; the Pittville or alkaline water contains, besides sodium chloride and sodium sulphate, a fair proportion of sodium bicarbonate. Baths are provided. The Cheltenham waters differ to a considerable extent from any other mineral waters found in England. They are fairly closely comparable with the waters of Marienbad, Homburg, and Tarasp-Schuls. The waters are useful for the same class of cases as are dealt with at Carlsbad, Marienbad, and Homburg. They are especiably suitable for gouty patients suffering from torpor of the hepatic and gastro-intestinal functions, and for cases of congestive enlargement of the liver with a tendency to hæmorrhoids. They exercise a very useful action on the liver, and are especially indicated in the treatment of hepatic congestion, hæmorrhoids, and "abdominal plethora." They are also of use in the treatment of gouty glycosuria.

LEAMINGTON.

The waters are cold. Altitude about 200 feet, but the climate is moderately bracing. The waters are of the alkaline sulphate type, and contain small quantities of sodium sulphate, magnesium sulphate, calcium sulphate, and sodium chloride. They exercise a mild aperient effect. Baths are provided. The waters are useful in the treatment of torpid conditions of the liver and of the gastro-intestinal tract, in some forms of dyspepsia, and also in the treatment of glycosuria. Leamington is a favourite place of residence with those who suffer from chronic derangements of the liver caused by living for a long time in hot climates.

WOODHALL SPA.

Although only about 40 feet above sea level, Woodhall possesses a bracing climate owing to its situation in Lincolnshire about 23 miles from the sea-coast. It is prettily wooded and is surrounded by moorland country. The waters contain about 2 per cent. of sodium chloride, and, in addition, small quantities of bromides and iodides. Good baths are provided. The spa is useful in the treatment of rheumatoid arthritis, the various forms of fibrositis (chronic rheumatism), leucorrhœa, fibroid tumours of the uterus, catarrh of the respiratory tract, the gastro-intestinal and hepatic forms of gout, and in cases of gouty dyspepsia associated with general atony.

DROITWICH.

The waters of Droitwich consist of a saturated solution of common salt, and supply the brine baths for which the place is celebrated. These baths are especially beneficial in the treatment of the various forms of fibrositis (chronic rheumatism) and fibrous enlargements, sciatica, rheumatoid arthritis in the chronic stages, and in cases of stiffness and thickening of the joints from chronic gout. They should be avoided if skin affections are present. The baths are open all the year, but the summer and early autumn months are the most pleasant to spend at Droitwich.

MALVERN.

Average altitude about 520 feet. It possesses a dry bracing inland climate, and the air is especially suitable to convalescents and invalids on account of its tonic character. Malvern is supplied with brine from Droitwich, so that brine baths can be obtained, and the same class of cases can therefore be treated as mentioned in connection with Droitwich. The place is open all the year, but the spring, summer, and early autumn months are the best.

MATLOCK.

The temperature of the water is 68° F. The altitude of Matlock Bath is 300 feet, that of Smedley's hydro-therapeutic establishment 450 feet. Matlock Bath itself is not very bracing owing to its situation low down in the valley. The position of Smedley's establishment renders it more bracing. The waters contain but small quantities of mineral constituents, and are mainly used for bathing. They may be used for the treatment of any of the conditions mentioned in connection with Buxton.

BATH.

BY GILBERT A. BANNATYNE, M.D., F.R.C.P.

BATH is particularly fortunate in its climate. Situated as it is in a sort of natural basin surrounded by hills which to a large extent shelter it from the north, east, and south-east winds, it enjoys a mild, equable, and slightly humid climate. Although surrounded by hills to a large extent, yet it is open to the west and south-west, and the winds from these two quarters cause a constant current of fresh air to flow up the course of the valley and prevent any stagnation. Even on the hottest day one seldom feels the heat oppressive. The humidity of the air at some periods of the year may cause a certain slight feeling of depression, but by living in the higher parts of the city this depression may be quite overcome, and it is so very occasionally felt that one can hardly look on it as a drawback. The city itself lies in the valley, but much of it extends upwards on to the slopes of the hills forming terraces and crescents with magnificent aspects and views, and which, of course, become more and more open as one ascends. Hence, for residential purposes, it is possible to choose almost any type of climate, for the higher one goes the fresher and more bracing does the climate become.

The Bath climate is essentially mild and equable, and, therefore, is eminently suitable for the permanent as well as the temporary residence of invalids and those of delicate constitution. As a permanent residence it seems specially to suit the aged, those who have lived in tropical climates, those who suffer from low nervous vitality, asthma, bronchitis, insomnia, rheumatism, gout, etc., and those who are more or less in weak general health. Consumptives do very well on the highest levels. The gouty and rheumatic also do very well, but it is important to remember that rheumatic patients should not choose permanent residences in quite the lowest part of the town, for, like all valleys, the Avon valley is damper at certain periods of the year than are the higher slopes of the hills. For temporary residence rheumatics do quite well on the lower levels. On these lower levels there are many advantages to invalids requiring mineral-water treatment;

thus it is of distinct advantage for people at all crippled to live near the waters, but, in the height of summer, I recommend rheumatic visitors to live higher up, as the air is fresher and more bracing.

The Bath climate appeals to visitors most in autumn, winter, and spring, as it is during these periods that its mildness is most marked. Yet even in summer many invalids find a stay in Bath delightful and beneficial. For those requiring mineral-water treatment, the best months are February, March, April, May, September, October, and November. The only class of invalids who do not do well in Bath are those requiring a vigorous and bracing air, and to whom the East Coast of England specially appeals. The Bath climate is not bracing—it is mild, but yet not enervating if suitable altitudes are chosen. Besides this, it is equable. Being partly surrounded by hills, which tend to prolong the process of radiation, the heat in Bath is moderated in summer and the cold in winter, and it has a high mean daily temperature which suits invalids well, the ranges being greatest in summer and lowest in winter. On Lansdown in summer the mean temperature is less, as it is also in winter, while the mean daily range is 1½ degrees in excess of that in the lower parts of the city. The wettest months are November and December, the least so being May. The average rainfall is 30·48 inches, and the average number of wet days is about 161, but, as much rain falls by night, the number of fine days as ordinarily reckoned greatly exceeds this. The subsoil being of a nature to dry quickly, the roads, except in winter, seldom remain wet long. The sunshine record for last year, a notoriously bad year, was 1,674 hours, which indicates a comparatively large amount of daily sunshine. Winds from the north and north-east quarters are most common in spring and least so in winter, whereas those from the south and south-west are most common in winter and least so in spring.

It may be claimed, that for rheumatic, gouty, and rheumatoid conditions, Bath is *hors concours*. Its waters, the only truly thermal ones in the kingdom (120° F.), are of very high radio-activity.

Taking it all round, Bath is a delightful place to live in, either for a long or short period, and there are interests and amusements to suit all tastes.

HARROGATE.

By WILFRID EDGECOMBE, M.D., M.R.C.P., F.R.C.S.

THE peculiarity of Harrogate lies, first, in the extraordinary variety of its waters, and their consequent adaptability to quite different types of disease; and, secondly, in its altitude and bracing climate, with the consequent avoidance of enervation during a "cure."

The features of the climate are its dryness, the abundance of sunshine, and the peculiarly invigorating character of the air. The last quality, though indefinable, is very striking, and at once arrests the attention of the visitor. Such a power of stimulation is afforded by this and other factors that, following a course of treatment, an "after-cure" is seldom required. Though cold in winter, the spa is visited by more robust invalids in considerable numbers.

Within the district are over 80 different springs, 16 of which are used internally, the remainder for bathing. The drinking waters fall into two groups, sulphur and iron waters, respectively. The *sulphur group* consists of cold muriated waters, strong and mild, heated artificially. The most important is the "old Sulphur Well," which contains SH_2, sodium sulphide, NaCl in excess, and a considerable charge of barium chloride. In action it is aperient, alterative, and markedly stimulating to the liver, as proved experimentally. The "Magnesia Well" is an example of a mild sulphur water: it contains like ingredients in smaller quantities, and is actively diuretic. The springs used for bathing are strong, mild, and alkaline sulphur waters of various degrees of salinity and sulphur content.

Eliminatory treatment by the sulphur waters and baths is of service in the following conditions: hepatic inadequacy; the gouty state, with its accompaniments, dyspepsia, glycosuria, albuminuria; gastro-intestinal catarrh; cholelithiasis and catarrhal jaundice; skin diseases, especially eczema in gouty subjects; seborrhœic eczema; psoriasis, and parasitic affections. The different strengths of waters available enable the treatment to be adjusted carefully to the individual requirements of each patient. Similarly, the different strengths of baths, from the soothing alkaline to the stimulating strong sulphur baths, are well adapted for the treatment of skin diseases in various stages.

The *iron group* consists of saline-iron waters, the chief of which is the Kissingen spring, containing NaCl in excess, ferrous carbonate, and a small volume of CO_2; and strong and mild chalybeates, the most important being the chloride of iron well, one of the strongest natural iron waters known. It contains both ferrous chloride and carbonate in large quantities; also barium chloride and CO_2. The milder iron waters are well adapted for administration to children.

Overshadowed by the sulphur waters, the iron waters of Harrogate have not received the recognition they deserve; in the absence of the former, they alone would suffice to give repute to the spa. They are valuable in the treatment of chlorosis and secondary anæmia; convalescence from acute illness; neurasthenia; debility and malnutrition in children; and surgical tuberculosis.

Besides the natural waters and baths, Harrogate is well equipped with modern hydro-therapeutic appliances, located in two bathing establishments, the "Victoria" and "Royal" Baths; the latter is the finest and most luxurious of its kind in the kingdom. Other conditions may be mentioned, for the treatment of which facilities are provided; heart disease, by baths and exercises; muco-membranous colitis; arthritis of all kinds.

A not unimportant adjunct to treatment at a spa is the recreation available for patients or their friends. In this respect Harrogate is well provided. Situated in a charming country, varied in its attractions, from hilly moorland, to undulating wooded pasture-land and river scenery, and full of places of antiquarian interest, it forms an admirable centre for motoring, driving, and cycling. The "Stray," a broad expanse of open grass land, 200 acres in extent, around which the town is built, is intersected by numerous asphalted walks, which permit of promenading in fine, and soon after wet weather. A favourite resort is Harlow Hill, an open moor, 600 ft. in height, bordering the town in the west. There are two 18-hole golf courses, one hilly, the other somewhat flat; each distant two miles, and easily reached by train. For indoor recreation, excellent concerts are given daily by the municipal orchestra at the Kursaal, a magnificent concert-hall recently erected. There is a theatre at which the best provincial companies appear during the season, and most of the hotels and hydros provide evening entertainments. To bridge-players the Harrogate Social Club offers its hospitality.

The climatic and other conditions are unsuitable for catarrhal respiratory troubles, subacute febrile rheumatism, neuroses of the irritable type, and progressive organic disease. The strong sulphur waters are contra-indicated in chronic renal disease with high arterial tension and especially if œdema is present.

A NOTE ON CHURCH STRETTON.

BY N. HAY FORBES, F.R.C.S. ED.

THIS beautiful health resort in the "highlands" of South Shropshire, 630 feet above sea-level, surrounded by wooded hills from 1,250 to 1,700 feet high, is famed for pure air, bracing climate, and very picturesque scenery; the season being from April to October.

Amply supplied with good drinking-water, well drained and lighted, with good hotels and apartments, it is only 4½ hours from London. The climate combines, with its "tonic" character, a "tranquillising" influence on the circulation and nervous system. The air is rich in ozone and comparatively dry. The rainfall for 1907, an unusually wet year, was 35·65 inches. The prevailing wind is south-west. "Stretton Spa" is rich in geological, historical, and archæological features. The average death-rate is about 7·2 per 1,000.

The saline springs at Wentnor and its vicinity are rich in sodic and calcic chlorides. The summer climate is especially suitable for the "open-air" treatment of neurasthenia; for the sequelæ of influenza; simple insomnia; functional nervous diseases; delicacy in children; medical and surgical convalescence; general debility; the curable anæmias; rheumatoid arthritis; chronic gout, chronic gastric and bronchial catarrh. It is also a "haven of refuge" from overwork and the "rush" of twentieth-century life. There are excellent golf-links, and good facilities for cycling, riding, tennis, motoring, fishing, hunting, and shooting.

LLANDRINDOD.

Abstracted and abbreviated from a Paper

By W. WILLIAMS, M.A., M.D., D.P.H.

STANDING in the centre of a broad and breeze-swept common, 710 feet above sea level, with surroundings of mountain and moorland, and with a pure and bracing air, Llandrindod-Wells has great advantages as a health-resort, apart from its merits as a Spa. It is mild in temperature, and the rainfall is less than the average for the west of England. Though surrounded, except to the S.W., by hills, which are some distance away, the country is free and open, save for the sheltering heights of Radnor Forest towards the east. In cases of nervous exhaustion from overwork or worry, and for those requiring a change from city life, its pure and invigorating atmosphere often proves rapidly beneficial. The hotel and other accommodation is satisfactory. The season lasts from May to October. Invalids will find May and June the best months. There are three golf links in the immediate vicinity.

As a Spa, the last 30 years have seen Llandrindod attain to high rank. It is now a solidly built town, with well-paved streets, good drainage, an abundant supply of pure water and excellent sanitary conditions. It is rich in mineral waters, as, indeed, is the whole region. They are classed as saline, sulphuretted and chalybeate; but each class, again, save the chalybeate, varies in its constituents: thus, one saline water has a large proportion of magnesia or lithia salts—another, of calcium salts. All the waters are used internally, and some for baths. The saline is generally served hot, being passed through coiled pipes immersed in hot water, thus retaining the gases. The pump-rooms have recently been enlarged and improved, and there are comfortable and well-equipped baths in adjoining buildings. Besides the ordinary reclining baths, at any temperature required, there are shower, douche, Aix-douche, vapour, and radiant heat and light baths. Massage and Schott movements are used in suitable cases.

Analyses show that: (1) All the waters contain a large proportion of chlorides of sodium and calcium, with much smaller amounts of chlorides of potassium and magnesium, together with small quantities of iodide of potassium. (2) Sulphates, as sulphates of calcium, magnesia, potash, and iron are found in small quantities, or are altogether absent. (3) Lithia salts, 3·83 and 5·7 grains per gallon of the chloride and carbonate respectively, are present in the lithia saline spring. (4) Sulphuretted hydrogen gas present varies from *traces* to as much as 14·35 cubic inches per gallon in the radium sulphur spring. (5) The chalybeate water contains a considerable amount of saline ingredients, and some 1·26 grains per gallon of carbonate of iron. (6) An examination of the residue of the radium sulphur spring showed the presence of a radio-active body, believed to be radium. (7) The amount of oxygen varies from *nil* to 8·1, and of carbon dioxide from *nil* to 2·2 cubic inches.

The waters are efficacious in rheumatism, gout, dyspepsia, anæmia, diabetes, incipient phthisis, nerve exhaustion, some skin diseases, etc. The saline waters are mildly aperient, especially the lithia saline, which is also diuretic and alterative, according to the water taken. Taken internally they are beneficial in rheumatism, gout, dyspepsia, jaundice, hepatic hyperæmia, chronic constipation, diabetes mellitus, glycosuria, obesity, etc. In gouty subjects, the saline is generally given with one or the other of the sulphur springs, and is said to be of special value in cases of sluggish liver, with a tendency to constipation. Large quantities of saline water are contra-indicated when there is irritability of the gastro-intestinal canal, or much irritability of the bladder. They are dangerous in cases of advanced renal degeneration. The sulphur waters, containing sulphuretted hydrogen (in one case 14·35 cubic inches to the gallon), are stimulating to the mucous membranes and to the skin, as well as diuretic and alterative. They prove very efficacious in chronic rheumatism and gout, chronic bronchitis, and some skin diseases. They are not aperient or directly astringent. These waters are recommended in cases of chronic gastritis, chronic inflammation of the urinary tract, glandular enlargements, and strumous affections. A combination of sulphur and saline waters is especially beneficial in gout, chronic rheumatism, and early forms of rheumatoid arthritis.

THE CLIMATE AND HEALTH RESORTS OF SCOTLAND.

BY F. J. CHARTERIS, M.D.

FROM the point of view of health resorts, Scotland is extremely poorly supplied with medicinal spas. Only one, Strathpeffer, can make any claim to be considered in the first class. There are, indeed, many other places which possess mineral wells, but in all cases these waters are of secondary importance to the climatic claims. This statement is true, for example, for such places as Moffat, Bridge of Allan, and Dunblane, all of which enjoy a considerable vogue as climatic health resorts quite irrespective of the comparatively weak mineral waters, which they offer. From the point of view of climatic resorts, Scotland is of more interest. It offers a fair range of typical climates, varying from a moist, fairly equable temperature on the west coast to a dry bracing east coast climate. In the northern Highland region, Speyside and Braemar, in the south, Crawford and the Leadhill's district, present a fairly high elevation, and are used as mountain resorts of a low altitude. To appreciate the peculiarities of the Scottish climate it is necessary to understand in a general way the configuration of the land, as the climate depends upon it.

From this point of view Scotland may be conceived as a northerly mountainous region bounded on the south by a line running from Aberdeen to the Clyde. The southern half consists in its upper portion of a flat, fertile, lowland district, which gives place in the south to a mountainous plateau formed by the Lammermuir Hills and the Cheviot Hills. Scotland, therefore, consists of a comparatively small central lowland district, bounded on the north and south by a mountainous plateau. Of these elevated regions the northern one is much the more massive and consists of higher hills. In it the peaks are more rugged, and the land is covered with moorland and comparatively little forest land is seen. The northern Highland district is bisected by the line of the Caledonian Canal, which runs obliquely from Inverness to the south-west. South of this canal lies the mass of the Grampians, while north of it are the mountainous districts of Sutherland and Ross-shire. In Caithness, in the extreme north-east of Scotland, an area of low-lying land is found which is continued as a comparatively narrow belt along the shores of the Moray Firth and then southward along the Aberdeenshire coast till it reaches the lowland plain. It should be observed that the northern mountains are massed more on the west coast than on the eastern side. On the west the land rises almost directly from the coast-line, but on the eastern side the mountains cease before the coast is reached. The narrow coast strip of low land is thus sheltered on the west by an elevated plateau. It is to this range of mountains that the comparative dryness of the eastern side is due.

In the southern mountainous region, the formation of the hills is less rugged than in the north. The southern hills are of the broad, rolling, steep-side variety, covered with grass. Their influence upon the climate of Scotland is by no means so important as that of the northern mountain mass. In the south, the mountainous district runs almost from east to west, whereas in the northern area, the trend is more diagonal and the general direction is from the west coast in a north-east direction. The prevailing winds for nine months of the year are from the west and south-west, consequently the southern range of mountains, which runs almost due east and west does not afford so much protection as the more diagonal trend of the northern ranges. The steady south-westerly blow produces two factors, which affect the climate of Scotland. They cause the surface ocean drift which propels the warmed water, that makes the climate of Great Britain so much more genial than that of Continental places situated in the same latitudes. But by the long exposure to the sea, the air tends to become saturated with moisture. This moist air striking the high land on the western coast is deflected upwards into colder atmospheric zones, and the condensed moisture is deposited in the form of heavy rains on the western coast. By the time that the air has reached the east side of the mountain chain it is comparatively free of moisture, and therefore the rainfall on the east coast is much smaller than on the west. The same holds true for the Braemar district, lying high, but directly under the lee of still higher hills. Thus Rothesay and Greenock on the west coast have an average annual rainfall of 47 and 59 inches, as they receive the full effect of the moisture-laden, south-west winds. On the other side, Elgin and Aberdeen receive the same wind after it has been freed, in great part, of its moisture and show a correspondingly lower rainfall of 25 and 27 inches. The heaviest rainfall of all is got at the foot of the highest hills: thus at Fortwilliam the fall is as high as 100 inches. The general rule of the relative dryness of the east coast as compared with the west holds true in all districts in the west where there are hills. The dryest areas on the west coast are in Ayrshire, where the sea land is quite flat and there is nothing to catch the moisture-laden air.

While the west compares unfavourably with the east coast in rainfall, it has a slight superiority in winter temperature. The sea in winter is warmer than the land, and consequently the wind from the sea is comparatively warm. As the west coast receives the full benefit of this heat, it is roughly about 2° F. warmer in the winter months than the east coast, as by the time this side is reached the air has been forced up into colder strata of the atmosphere and deprived of its moisture.

In the summer months this factor is not so powerful. The winds are less constantly from the south-west, and the main factor in elevating the temperature is the incidence of the sun's rays. In the southern regions these rays are more vertical, and, therefore, powerful; but to some extent this is counterbalanced by the greater length of the northern day. The west side is, however, no warmer than the east coast.

From this account it will be obvious that different areas in Scotland show considerable differences in climate. The best plan to follow will, therefore, be to select places typical of their respective districts and describe them.

In the extreme north-east corner of Scotland one meets, in Caithness, an area of flat low-lying ground which is of some interest. Situated so far north, one would expect here a very cold winter; yet we find that in this region the average winter temperature is higher than in any other part of the east coast, being close on 34° even on the coldest January night. The average January temperature in Thurso, which may be selected as typical of this district, is about 37·5° F. The July average is 56·3° F. The town enjoys an equable climate. The rainfall is not high, being under 30 inches. It is beautifully situated on the bay of the same name. The surrounding country is interesting, and there is ample provision in the way of games and sport. The district is greatly exposed to winds, and there is an absence of trees and vegetation. As a result of this, it has been found that sufferers from hay fever enjoy almost complete immunity. Asthmatics also do well. There is almost complete absence of snow and frost. In summer there is excellent sea-bathing. We give, with all reserve, the statement from a local guide-book that the visitor may enjoy "whale-fishing and tennis in season."

Farther south, along the coast of the Moray Firth, we have a narrow coast strip which enjoys the best climate in Scotland. Protected very thoroughly by the great mass of Highland mountains, this district has a small rainfall and an abundance of sun, which renders it a particularly suitable place for retired Anglo-Indians and elderly invalids.

We may take Elgin as typical of the district. It lies about four miles from the Moray Firth, and is protected to some extent by a range of low hills from north winds. The climate is very dry. The average rainfall is 25 inches. In winter, the average temperature is 38·4, and in summer this rises to 60, giving an average over all the year of 47. It is said to be somewhat relaxing in midsummer, but the winter climate is excellent, with much bright sunshine. Owing to the presence of cold north and east winds, spring is rather trying. Autumn is exceedingly good, and lasts to the end of November. Elgin is a pleasant place to live in, and there is excellent golf at Lossiemouth.

Except in the spring, Elgin will be found very suitable for chronic elderly invalids, who do not require much nursing or surgical treatment. In this neighbourhood, to the north-west of Elgin, we have Forres, a small, pleasantly-situated town, which is well sheltered. It is built on a terraced slope, and the surrounding country is well wooded, and beautiful walks and drives are available. The climate is very dry and the air extremely pure. It is very suitable for residence in the spring and early summer, but otherwise presents little advantage over Elgin. The temperature runs from 38° F. in the colder winter months to 57·6° in the summer.

Further south the climate becomes more rigorous. On the Aberdeenshire coast, Stonehaven is the chief place. Cruden Bay is too exposed, and is only suitable for a bracing change in the summer and autumn months. It is too cold in winter.

In Fifeshire, we have the typical east coast climate, dry and extremely bracing. Westerly winds prevail; but in the spring it is unpleasant, as extremely chilly east winds blow, and often bring with them the disagreeable "haar" or sea mist. As typical, we may select St. Andrews. The mean winter temperature is 39 and the summer 59, while the annual rainfall is about 27 inches. As a town, St. Andrews presents many points of interest. The seat of an ancient university, it possesses old buildings of great historic interest, and the surrounding district is charming. The golf links are famous. It is extremely bracing in the autumn and early winter months, and, as such, is in much favour by those who, coming from the relaxing damp west coast, require a dry, bracing climate to recuperate in after debilitating illness. It is, perhaps, rather too rigorous in the spring months to be suitable for residence all the year round.

South of Edinburgh, along the coast, we have favourite watering-places in North Berwick and Dunbar. The former is in considerable vogue, even in the winter months, as a bracing place, which is sunny. Situated on the sea coast, in the midst of famous golf courses, it is much frequented in the summer and autumn. The climate is typically east coast, though more genial than that of St. Andrews.

The west coast climate is more relaxing than that of the east coast. In winter it is somewhat warmer, averaging 2° F. more than the east. The rainfall is very much greater, especially in the northern half, where it varies from 40—60 inches. In the south, along the Ayrshire coast, it is drier, averaging about 30 inches. Owing to the absence of coast hills, the rainfall approaches more nearly that of the east coast. In summer the temperature is about the same as similar places on the east side. In spring, the west coast climate is good.

April and May are usually dry and sunny, while there is an absence of the chilly east winds which render the east coast so treacherous and unpleasant. There are no coast towns, which are much in demand as winter health resorts. Rothesay enjoys a very mild winter, but is too damp and relaxing to be suitable for permanent residence. The temperature in Rothesay is very even. In the coldest months, December, January, and February, it runs between 39°—41° F., and the mean temperature of the year is 47·8° F. The rainfall is large, about 45 inches. In the summer months the small coast towns along the Firth of Clyde are fairly pleasant places to stay in, but in winter they are all insufferably dull.

MOFFAT.

In the south of Scotland, the principal health resort is Moffat, a small town in Dumfriesshire, which possesses sulphur and chalybeate waters. The sulphur spring has been known for nearly three centuries, but the iron spring is of more recent discovery.

Moffat is a charming little town, situated among hills varying in height from 800 to 2,600 feet, which shelter it on the north, east, and west. The town itself is about 350 feet above sea level. It is open towards the south. The soil on which the town is built is gravelly, so that the roads dry rapidly. Surrounded, as it is, by hills it is natural that heavy rainfalls should occur, yet the annual fall is less than that in other similar places. For the past twenty years the average rainfall is about 40 inches. It ranges from 31 to 50 inches. Though this seems somewhat high, the place is not really wet, as the rain, owing to the proximity of the hills, falls in heavy showers, which soon pass off. The average temperature does not vary greatly. and, on the whole, the climate is wonderfully equable. In spring and autumn it is very pleasant, but in midsummer, owing to the southern exposure, it is apt to get rather stuffy. On the whole, the climate is distinctly bracing, especially in autumn and spring. Owing to the high situation and entire absence of manufactures, the air is extremely pure. Elderly people sometimes find it too bracing at first; but that they soon get accustomed to this is shown by the fact that the place is in great vogue as a permanent residential place for retired folk. The bracing climate makes Moffat a very suitable place to send otherwise healthy individuals who have simply been run down, or who are convalescing from debilitating disease. The town is pleasant to live in, and the surrounding hills and country afford innumerable walks and climbs of all possible descriptions. To those who wish for more active exercise, there is a capital golf course, which is somewhat hilly and windy. There is excellent fishing to be obtained in the neighbourhood.

The sulphur spring attracts a different class of patient. The well is situated about a mile and a half from the town, and the water is conducted by pipes to a small central bathing establishment in the town. The water contains a small quantity of saline material, but its chief medicinal properties depend upon the fact that it contains a fair quantity of hydrogen sulphide, about 5 cc. per litre. The water is rather unpleasant in taste. When absolutely fresh it is quite clear, but the sulphuretted hydrogen separates out in bubbles, so that to obtain the full benefit the water must be drunk at the well. The water escapes from the well at a temperature of 49° F. The saline content is sufficient to produce a mild diuretic action, but not to cause any purgation. The special conditions, which have been found suitable for the sulphur treatment, are chronic rheumatism, gout, and skin diseases such as acne, eczema, psoriasis. It is also found useful in chronic bronchitis and abdominal congestion.

BRIDGE OF ALLAN.

Situated on the banks of the river Allan, this town is a avourite health resort with many medical men in Glasgow and Edinburgh. It is readily reached from either town by a short train journey, so that it is eminently suitable as a first change for convalescent patients who cannot stand a long railway journey. The town itself is well situated. It is protected by hills and woods from north and east winds. The main portion of the town lies in the valley, but there are numerous villas built up on the hills which face south and thus, though sheltered, obtain all the sun. The climate is mild but somewhat relaxing. In autumn, it is apt to be rather damp. The clay soil on which the town is built does not dry readily and in wet weather the roads become very unpleasant for walking. The climate is at its best in winter and spring, when the weather is usually fairly dry. There is rarely any serious fall of snow. In summer the air becomes rather warm, and Bridge of Allan tends to prove relaxing. In addition to its climatic claims, Bridge of Allan contains a mineral well. The water comes from some old copper and silver mines. Its mineral character was first recognised in 1820, when all deleterious matter was removed from one of the mines. Since then an abundant supply of natural mineral water has been obtained. The waters are non-thermal and analysis shows that they are rich in the chlorides of calcium and sodium, while, in addition, magnesium occurs as the chloride, bromide, and carbonate. The waters are used both externally and internally, and are advocated in chronic affections of the liver, stomach and bowels, in skin disease, and in rheumatic and gouty affections.

As a place to live in Bridge of Allan is rather dull. For those in fairly active health, there are the usual amusements—golfing, fishing, bowling, etc. There are numerous short walks of considerable interest, while the place is very fortunate in possessing a number of pleasant drives or round tours. There is a tramway service to Stirling, which enables one to reach readily that charming town, rich in historic interest. The class of patient that does best in Bridge of Allan is the chronic invalid, or elderly person who has become permanently deteriorated in health. It is a favourite place to send children to, who are convalescent from infectious disease. There are good facilities for educating children. Speaking in general terms, however, Bridge of Allan is best suited for chronic, elderly individuals.

DUNBLANE.

Dunblane and Crieff are more bracing than Bridge of Allan. Dunblane is situated in hilly country, on the western slopes of the Ochil Hills, with the Grampians on the north and north-west, while to the south the Campsies are seen. The prevailing winds are from the west and south-west, and, owing to the high situation, these winds are distinctly felt. But the place is well sheltered from the cold north and east winds. The soil is chiefly red clay, but in parts it is distinctly sandy. There are pine woods in the neighbourhood, and many interesting walks are available. The chief therapeutic establishment is the Hydropathic, which stands high, about 500 feet above sea-level. It contains a well-furnished electrical, therapeutic installation, under the charge of an experienced medical man. A supply of mildly aperient natural mineral waters is brought to the Hydropathic direct from its source in the Cromlix Hills, and this is used in cases of visceral congestion with some success. Dunblane, in the winter months, is rather quiet, but there is a very good sporting golf course. The place is useful as a bracing change after influenza and breakdowns. It does well for chronic pulmonary conditions. In summer, the place is in large demand by summer visitors, and is not then very suitable for invalids, who desire a quiet resort.

STRATHPEFFER.

The most celebrated spa in Scotland is that of Strathpeffer, in Ross-shire. Situated amid charming Highland scenery, it has many claims on our attention. The spa is situated about 25 miles north-west of Inverness, in a beautiful valley, which is surrounded by hills on the north-west and south sides. It is fairly open towards the east, but on the other sides is well sheltered. The climate is mild, yet bracing, and comparatively dry, as the annual rainfall of 25–30 inches shows. The soil is sandy. Situated in the midst of varied scenery, amid moors, wood, lochs, and mountains, there is infinite scope for excursions and drives, so that the neighbourhood is perfectly suited for those in search of health. It is not only a mineral spa, it is also a health resort. The distinguishing feature of Strathpeffer is, however, the presence of strong sulphur wells. There are four wells in use. They are similar in type to those in Moffat, Harrogate, and Aix-la-Chapelle, but surpass all these in strength. In the Strathpeffer water, the sulphur is present chiefly in the form of sulphuretted hydrogen, but in addition it occurs as sulphates combined with magnesium, calcium and sodium, and as sulphides of potassium, sodium, and iron. Further, a certain proportion of the sulphur exists in a free state. In the Strong Well the total content of sulphur is over 30 grains to the gallon. Contrasted with this, the other sulphur waters are much weaker. Thus Harrogate contains only about 8 grains to the gallon. Moffat, as we have seen, is still weaker, while Aix-la-Chapelle shows about 4 grains of sulphur to the gallon. The quantity of gaseous sulphur in Strathpeffer is also much larger than that of most sulphur water. The Strong Well at Strathpeffer has over 11, and the Cromartie Well 19 cubic inches of H_2S to the gallon, against 3 cubic inches in Harrogate waters and ⅓ cubic inch in Moffat. It is, thus, much the strongest sulphur water in Great Britain. It resembles Moffat in that it only possesses a comparatively small saline content, whereas Harrogate contains relatively much more saline material, notably in the form of magnesium chloride, which confers on the water its purging character. Despite its strength in sulphates the effect of the Strathpeffer water is not at all purging. It can, therefore, be taken in larger quantities than other waters, as the water acts chiefly as a diuretic. The action of sulphur water seems frequently to be intensified by the addition of saline purgatives. In Strathpeffer, it is often found advisable to add magnesium sulphate to the water. The Strathpeffer water is non-thermal. In the quantity usually taken internally, about 2 to 3½ pints in the day, the waters are usually well borne and do not upset the digestion. The waters are also much used externally. The most useful adjunct is peat baths, which are very useful in chronic rheumatism. The bathing establishment is well equipped. The water is beneficial in chronic forms of rheumatism, rheumatoid arthritis, and gout. Chronic scaly skin diseases, as eczema and psoriasis, especially those forms depending on gouty or rheumatic diathesis, do well. Visceral congestions and sluggish portal circulation, chronic gastric and intestinal catarrhs are also much benefited by a cure at Strathpeffer.

THE CLIMATE AND HEALTH RESORTS OF IRELAND.

BY JAMES ALEXANDER LINDSAY, M.A., M.D., F.R.C.P. (LOND.),

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General Considerations.—Ireland has been compared with a dull picture set in a beautiful frame. The interior of the island consists mainly of a vast plain, seldom rising to a higher elevation than 200—300 feet, which includes the extensive bog-land of the Bog of Allen, the rich grass lands of Meath, Westmeath, Roscommon, and Tipperary, the corn fields of Down and Tyrone, and the orchard country of Armagh. This plain is well watered, and in parts highly fertile, but the scenery is in general devoid of attraction, and no health resort of the first class is included in its area. The Irish coast country presents a marked contrast to the interior. It is in the main hilly or mountainous; the scenery is varied, interesting and picturesque, while in some places—as in Wicklow, Kerry, and Donegal—there are districts of ideal beauty and charm, not surpassed in their own line in Europe. The coast is much indented on the south and west, and the fiords of Kerry fall short of their Norwegian rivals only slightly in grandeur, while surpassing them in richness of verdure and beauty of colouring. The north-east coast of Antrim, where basaltic rocks have overflowed the original Jurassic and cretaceous strata, presents a grandeur of outline and a picturesqueness of detail unsurpassed in the British Islands. The soil of Ireland is in many parts peaty, and hence retentive of moisture; in other parts it is a rich loam well adapted for the purposes of pasturage and agriculture, while hard clays, chalks, and gravelly soils are relatively rare.

General Characters of the Climate of Ireland.—The climate of Ireland has often been unjustly aspersed. It has been put down as wet, sunless and relaxing, without due regard to its true characters, or sufficient allowance for the important climatic variations of different parts of the island. The late Lord Dufferin, whose knowledge of the world was exceptionally large, and whose opinion should command respect, is credited with the statement that "the Irish climate is the best in the world." It has been described by another observer as a bad climate for picnics, but a good climate for work or for health. Probably in no climate is there, on the average, less interference with daily activities than in Ireland. The hottest day is not too hot for work or exercise, the coldest day is not too cold. Extremes of all kinds are conspicuous by their absence. There is marked equability of temperature. Storms are infrequent, thunder and lightning are rare. The climate is showery, rather than wet, mild rather than relaxing. The rainfall is not excessive; there are parts of the East Coast where the annual precipitation is only from 25 to 30 inches, while over a very large area of the country the average is from 30 to 40 inches. A considerable portion of Ireland is drier than Devonshire and Cornwall, or Wales, or Cumberland, or Ross-shire, or Skye. The rainfall attains its maximum near the southern and western sea-board, where the lofty ranges catch the rain-bearing clouds from the Atlantic. Thus on Mangerton (Kerry) the rainfall is 86 inches and at Kylemore (Galway) it is 77 inches. Newcastle (Down), lying under the lee of the Mourne Mountains, has the relatively high average of 50 inches. We may compare these figures with the following:—Ambleside 80 inches, Grasmere 86 inches, Wythburn (Cumberland) 105 inches, Skye 90 inches. The impression that Ireland is an exceptionally wet portion of the British Islands has arisen, not from a strict regard to the rainfall, but from the relatively large number of days upon which an appreciable amount of rain falls. As the returns made by various observers of the number of "rainy days" per annum in various localities are apt to be vitiated by the fact that there is no strict definition of what constitutes a "rainy day," it is better to keep to the official meteorological returns which give the number of days upon which there is a precipitation of ·01 inch and upwards. I shall give the Irish figures, with some English and Scotch figures for the purpose of comparison.

Average number of days per annum on which there is a precipitation of ·01 inch of rain or upwards :—

1. Ireland :—

Kylemore	278	Portrush	243
Dunfanaghy	271	Newcastle (Down)	235
Valentia	263	Dublin	228
Killarney	254	Bray	226
Donaghadee	253	Kingstown	210
Greenore	245		

2. England :—

Keswick	262	Ulverston	228
Buxton	256	Matlock	226
Falmouth	247	Torquay	197
Penzance	245	Ventnor	180
Ilfracombe	234	Brighton	173
Plymouth	229	Hastings	170

3. Scotland :—

Inverary	285	St. Andrews	225
Rothesay	259	Dornoch	216
Mull	251	Banff	209
Greenock	251	Pitlochry	205
Dumfries	240		

It will be seen from the above statistics that, if we compare Ireland with the western portions of England and Scotland, there is no marked contrast in the proportion of days on which an appreciable amount of rain falls. How many days might be fairly described as "rainy" is, as has been said, a matter of opinion. A careful observer, the late Dr. Scott, estimated the average number of "rainy days" at Queenstown as low as 121 per annum. It may be affirmed with confidence that the wet character of the Irish climate has been much exaggerated.

A comparison of two of the most popular English resorts with two leading Irish resorts will serve to demonstrate that the differences between the two countries are much less than is popularly believed, and also that the superiority is not altogether on the side of England. We shall take Torquay and Ventnor as representing England, and Queenstown and Glengarriff as representing Ireland. The selection will be admitted to be a fair one:

1. Mean annual temperature:—

Torquay	49·4° F.	Queenstown	52·3°
Ventnor	50·8°	Glengarriff	52°

2. Mean winter temperature:—

Torquay	44°	Queenstown	44·21°
Ventnor	42·5°	Glengarriff	45°

3. Mean spring temperature:—

Torquay	50°	Queenstown	50·1°
Ventnor	48·5°	Glengarriff	50·1°

4. Average daily range of temperature:—

Torquay—January	to	March	9·9°
Ventnor	,,	,,	9·2°
Queenstown	,,	,,	9·1°
Glengarriff	,,	,,	—

This comparison might easily be extended, but enough has been said to show that Queenstown and Glengarriff are at least equal to Torquay and Ventnor climatically. These figures bring out clearly the peculiar mildness of the Irish spring on the southern and south-western coasts. The great difficulty of selecting a good spring resort for pulmonary cases is well known to every climatologist. Over a large portion of Europe, spring is the season of cold winds, sudden changes, deceptive sunshine. Perhaps these evils attain their minimum at such resorts as Queenstown and Glengarriff, where the east wind loses much of its fierceness and its parching quality.

Physiological Action of the Irish Climate.—There is no foundation for the common idea that the Irish climate is essentially enervating and relaxing. That in some localities such characteristics make themselves manifest in summer or early autumn is, of course, true, but the same accusation may be brought against the climate of Devonshire and Cornwall, of South Wales, of portions of Lancashire, and the West Coast and Islands of Scotland. On the other hand, few resorts in the

British Islands possess a more essentially tonic and bracing air than Portrush and Ballycastle, or Kingstown, Bray, and Greystones, while remote Kilkee, with the Atlantic on one side and the estuary of the Shannon on the other, is certainly not relaxing, nor is Bundoran in Co. Donegal.

While the Irish climate possesses a delightful freshness, and in some places a decided tonic property, it is in the main soothing rather than stimulating, and hence well adapted to many constitutions and states of debility or disease, where an element of excitation is undesirable. Many persons who find Brighton, Eastbourne, Cromer, or Scarborough too exciting for them, who are sleepless on the Riviera, or dyspeptic at Ostend, might with advantage try the more sedative air of the Irish resorts.

Therapeutic Indications of the Irish Climate.—The Irish health resorts offer special advantages for the following types of case :—

(*a*) Convalescents from acute disease.—This large class requires varying degrees of stimulation or the contrary. For the more robust convalescent, who is free from fever, marked emaciation, pronounced anæmia, or much nervous prostration, the north Irish coast is an ideal resort, and he may choose between the following : Rosapenna, Port Salon and Greencastle in Co. Donegal ; Castlerock and Port Stewart in Co. Derry ; and Portrush, Port Ballintrae, and Ballycastle in Co. Antrim. If more shelter and a lesser degree of stimulation seem indicated, the following resorts may be recommended :—Newcastle (Co. Down), Warrenpoint (Co. Down), Kingstown and Howth (Co. Dublin), Bray and Greystones (Co. Wicklow), Bangor and Donaghadee (Co. Down). Kilkee (Co. Clare) and Bundoran (Co. Donegal) are also good resorts for convalescents who require moderate stimulation, and who do not object to somewhat windy localities.

(*b*) Neurasthenia, nervous debility, insomnia, overwork.—The Irish resorts are well adapted for these cases inasmuch as the climate is on the whole soothing, and devoid of irritating qualities in the main. It must, of course, be remembered that cases of severe neurasthenia, or of the irritable type of nervous debility, do not do well, as a rule, at any seaside resort, and hence, that the Irish resorts are unsuitable. Such cases do best at inland resorts where there is a fair amount of shelter, preferably at an elevation of from 500 to 2,000 feet.

(*c*) Anæmia, chlorosis, amenorrhœa.—These cases do well at the Irish resorts, and the north, east, south, or west coast may be selected, according to the degree of stimulation judged to be indicated.

(*d*) Scrofula, diseases of bones and joints, spinal deformities. —The Irish resorts are well adapted for the treatment of these affections, and on the whole the northern and eastern coasts seem likely to be most suitable.

(*e*) Pulmonary tuberculosis.—Ireland has an evil reputation for a high phthisis rate, but the causes of this condition are undoubtedly hygienic and economic, rather than climatic. While it is hardly probable that any considerable number of phthisical patients will come to Ireland for residence and treatment, the island is by no means devoid of suitable resorts for the purpose. Glengarriff, in Co. Kerry, offers, amid surroundings of unique beauty and charm, climatic conditions closely analogous to those of Falmouth and Penzance. Queenstown is not inferior in any respect to Torquay. Rostrevor, beautifully situated on Carlingford Lough, has a considerable reputation in pulmonary cases. Greystones (Co. Wicklow) and its neighbourhood present many advantages for the treatment of tubercular cases. The Irish sanatoria for consumption, viz., the National Hospital for Consumption, Newcastle (Co. Wicklow); the Abbey Sanatorium on Belfast Lough; the Forster Green Hospital at Knockbreda, near Belfast; the Rostrevor Sanatorium (Dr. B. H. Steede); the Altadore Sanatorium, Co. Wicklow (Dr. J. C. Smyth); the Larch Hill Sanatorium, near Dublin (Dr. L. H. Hare), are all doing good and successful work.

(*f*) Bronchitis, emphysema, asthma, laryngitis.—The Irish resorts deserve special consideration in connection with this group of cases. The soothing quality of the Irish air is likely to be of special value in cases of irritable bronchitis with harassing cough and tough or scanty secretion, in the emphysema of the elderly, in laryngitis, and in some varieties of asthma. The last-mentioned disease is known to be very erratic, and, upon the whole, seaside resorts are not suitable for it, but the peculiarly balmy air of the south and south-west of Ireland is worthy of a trial in some of these troublesome cases.

(*g*) Dyspepsia, digestive, and hepatic disorders.—Ireland possesses a considerable number of spas and mineral springs, but none of them has more than a local reputation. Amongst the best known are the following:—Lisdoonvarna, Co. Clare (sulphur waters); Ballynahinch, Co. Down (sulphur and chalybeate waters); Lucan, Co. Dublin (sulphur waters); Mallow, Co. Cork (sub-thermal spring, sulphates of lime and soda, carbonic acid gas); Tralee (chalybeate waters). The accommodation at most of the above resorts is fair, and they are capable of much further development.

Many of the coast resorts in Ireland are valuable in cases of mild dyspepsia, without much hepatic derangement. The air of Portrush, Ballycastle, Donaghadee, and resorts of the same class is often found, or believed, to be "too strong" for dyspeptics. It is a matter for consideration whether the dyspepsia so often complained of at seaside resorts is not due to hard water, with much chalk impregnation, rather than to the sea air, to which it is usually attributed.

Contra-Indications for the Irish Health Resorts.—The following morbid conditions are not suitable for treatment at the Irish health resorts:—Rheumatism, rheumatic arthritis, gout, renal disease, nasal obstruction, pharyngitis, laryngitis with much secretion, bronchorrhœa. Some of my correspondents do not acquiesce in the inclusion of rheumatism and gout in the above list.

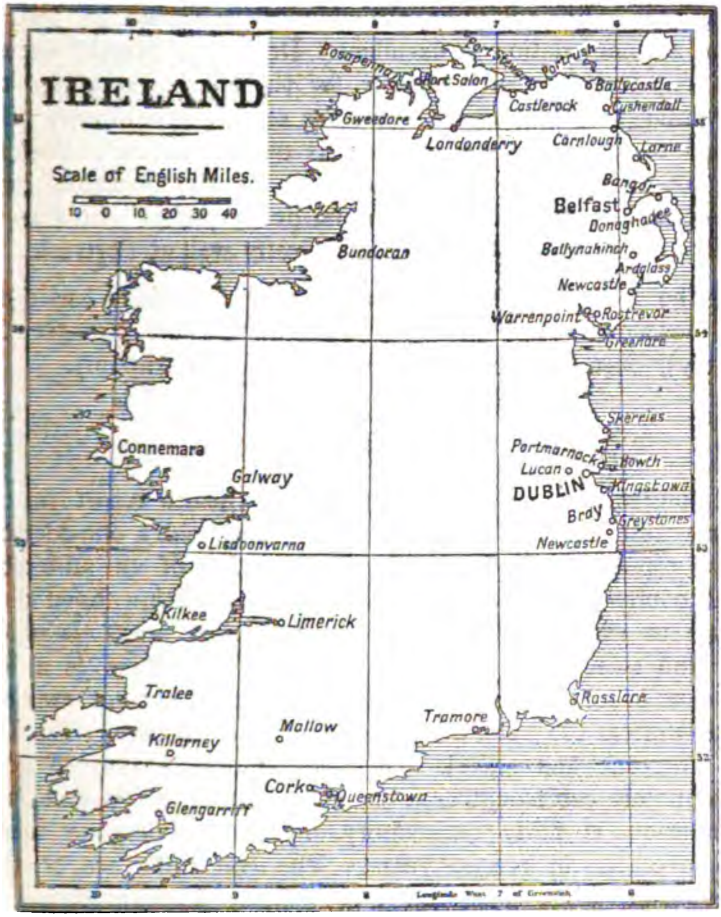
Subsidiary Features of the Irish Health Resorts.—Amusements.—We are often reminded nowadays, and with justice, that the health-giving properties of any given resort and its usefulness involve considerations other than those of climate, situation, possession of mineral waters, and the like. The invalid and the convalescent require amusement and distraction, nor can the legitimate demands of the healthy friends or attendants of the sick be altogether overlooked. The Irish resorts are, for good or evil, quite devoid of the species of attraction which draws the world to Aix-les-Bains, Baden-Baden, or Monte Carlo. There are no casinos or gaming tables in Ireland. Music is only provided on a modest scale, and is by no means usually of first-rate quality. The miscellaneous attractions which flourish on the sands of Blackpool, Margate, or Scarborough are not largely represented on Irish soil. The nigger-minstrel, the fortune-teller, the acrobat, and the juggler are not quite unknown, but they are not familiar and everyday phenomena. The Irish resorts may, indeed, be even pronounced by some people dull. It is a question of taste and of what constitutes pleasure. But on the other side of the account there are important items. Magnificent sea-bathing, unsurpassed in the world, can be obtained at the majority of the Irish coast resorts. Boating and yachting can often be enjoyed. Good fishing is frequently available. Golf of the very finest quality is in most cases at the service of the visitor. The links at Rosapenna and Port Salon in Co. Donegal; at Castlerock, Portrush, Port Stewart, and Ballycastle, along the northern seaboard; at Newcastle and Donaghadee in Co. Down; at Portmarnock and Dollymount, near Dublin; at Lahinch in Co. Clare—to mention a few out of many—are of first-rate excellence, as most golfers are already aware. Mountain climbing of an interesting kind can be obtained in the Mourne Mountains and the mountains of Wicklow and Kerry. The beauty of Irish scenery, and the richness of the Irish plant life, serve to enhance the charm of this invigorating pursuit. Hunting can be enjoyed at the proper season in most parts of Ireland, and is not surpassed in any country.

Seasons at the Irish Health Resorts.—Most of the Irish resorts are at their best in summer and early autumn. Queenstown is a good winter and spring resort. Glengarriff is at its best in spring, but is also good in winter. Newcastle deserves to be better known as a winter resort in bronchitic cases.

Accommodation at the Irish Health Resorts.—Formerly very defective, accommodation is now good at nearly all the Irish resorts, and at many of them it is of first-rate excellence.

The remainder of this article will be devoted to a sketch of a few of the leading Irish resorts, chosen, not solely for their merits, but as types of the different classes of resort.

Exigencies of space make the descriptions very brief, and many places are unavoidably omitted.



PORTRUSH, CO. ANTRIM.

The town is built upon a rocky peninsula, jutting out into the North Atlantic, and is surrounded by the sea on three sides. The foundation is sand or rock, and the ground dries rapidly after rain. There are magnificent sands and splendid sea-bathing. The water-supply is good, and the sanitary arrangements satisfactory. The air is extremely bracing and tonic at all seasons of the year. There is a deficiency of local shelter. The scenery in the neighbourhood is of unique interest. The golf-links are amongst the best in Ireland. The accommodation is excellent. Dr. J. C. Martin writes: "Portrush is specially suitable for those cases requiring the advantages of bracing air, residence on the promontory being equal to a sea voyage, without its disadvantages." Portrush is not suitable for nervous debility of the irritable type, hysteria, certain types of insomnia, or dyspepsia with sluggish action of the liver. Children do specially well at Portrush.

The following resorts have general conditions analogous to those of Portrush, viz., Castlerock and Port Stewart (Co. Derry), Port Ballintrae and Ballycastle (Co. Antrim).

BUNDORAN, CO. DONEGAL.

Bundoran is the most considerable health resort on the north-west coast of Ireland. It has long had a considerable local reputation, and recently the creation of an admirable golf course and improved hotel accommodation have done much to extend its popularity over a wider area. It enjoys the full sweep of the Atlantic breezes, but there is a fair amount of local shelter. The climate is tonic, but not exciting. The winters are very mild, but sometimes stormy. The soil is limestone and gravel. The water-supply is derived from a mountain catchment area six miles distant, and is excellent. Sanitation is fairly satisfactory, and has undergone much improvement in recent years. The golf links are of the first rank, and the hotel and general accommodation is good. Dr. R. F. Flood writes:—"Bundoran is well known as one of the most bracing health resorts in Ireland, specially suitable for patients recovering from acute illnesses, general debility, heart cases, rheumatic and gouty cases (good sulphur spa within ¾ mile of town); an ideal place for children, particularly those with tubercular tendencies."

NEWCASTLE, CO. DOWN.

Newcastle is beautifully situated on the shores of Dundrum Bay, and, lying under the imposing *massif* of the Mourne Mountains, it is well protected on every side except the east. The soil is sand and gravel. The rainfall is about 50 inches per annum. The water-supply is of the highest excellence. The sanitation is defective, but is at present undergoing an overhaul, which is expected soon to put it into a thoroughly efficient state. The golf links are amongst the premier courses in the British islands. Good fishing can be had. The sea-bathing is not of a high order, but is capable of improvement. Numerous walks and drives of great interest and beauty can be had. The accommodation is excellent. The Mourne Mountains afford admirable opportunities to the mountaineer and the botanist. The scenery is charming, and some rare plants will reward research. Dr. R. L. Bell recommends the climate highly in bronchitic conditions, owing to its exceptional mildness and relative immunity from east winds. He regards April, May, September, and October as the best months, but speaks highly of the winter climate also. Owing to local configuration the sun gets early behind the hills, so that pulmonary cases require to exercise care in the afternoons.

The following places have conditions analogous to those of Newcastle:—Ardglass, Rostrevor (well sheltered on the north and east), Warrenpoint, Greenore.

BRAY, CO. WICKLOW.

Bray faces the Irish Sea, but has a large amount of local shelter on the W., S., and N.N.E., owing to the proximity of the Wicklow Mountains, Bray Head, and Killiney Hill. The soil is sandy, lying on Cambrian rock. The rainfall is moderate, viz., 31·9 inches per annum. The air is comparatively dry. The water-supply is derived from the River Vartry and is excellent. The sanitation is satisfactory. The accommodation is of the first class. Good golf links exist; fishing can be obtained; the sea-bathing is excellent, and there are many opportunities for hill and mountain climbing. Dr. Cecil Brew recommends Bray in the spring and autumn for debility and anæmia, and at all seasons for chest cases and neurasthenia.

Greystones, about five miles south of Bray, possesses similar characteristics. The neighbourhood has acquired a reputation in phthisical cases.

QUEENSTOWN, CO. CORK.

Queenstown is situated upon an island in Cork harbour. The soil is light, gravelly, on grauwacke, with limestone in places. It is built on the south slope of a hill and is entirely sheltered from the N., N.E., and N.W.; partially sheltered from the E. and W., and is quite open to the S., S.E., and S.W. The rainfall is 32·8 inches; the mean annual temperature 52·3°; the mean temperature of winter and spring 47·5° (Dr. Scott). There is a good water supply. The town is well sewered. The accommodation is good. Good fishing, sea and river, is available.

Dr. R. Townsend recommends Queenstown in the following cases:—Chronic bronchitis, chronic laryngitis, asthma, phthisis. "Fuchsias, geraniums, zuccas, bamboos flourish without protection all the year round in the open air. There is scarcely a day in the year during some part of which an invalid cannot take exercise in the open air."

Glengarriff, already referred to in this article, has a climate similar to that of Queenstown, but even milder in character. The surrounding scenery is of rare beauty and charm.

KILKEE, CO. CLARE.

Kilkee is built round a crescent-shaped bay and is well protected on the W. and N.W. It is situated on a narrow tongue of land projecting into the western ocean, and is, according to Dr. Hickey, the most sea-surrounded spot in Ireland. The soil is dry. The weather is very mild in winter. There is good fishing and splendid sea-bathing. The accommodation is fairly good. There are fair golf links, and good tennis may be had. Dr. Hickey sums up the advantages of Kilkee as follows:—"Brine baths for rheumatics, grand bracing bathing, picturesque walks, a bracing atmosphere for debilitated people; a dry soil, walking pleasant in all weathers; winters soft, very mild, and suitable for bronchitic people."

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THE INFLUENCE OF HIGH ALTITUDES.

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DURING the last thirty or forty years, mountain climates have steadily attracted more and more attention to their physiological action, and to their influence in modifying disease. In tropical countries the hills have always offered at once a place of refuge from the heat of the plains and a recruiting ground where ailments, contracted in the lowlands, such as malaria, could be shaken off. Jourdanet, who practised in Mexico, and Archibald Smith, who practised in Peru, both noticed the comparative rarity of phthisis at high altitudes, and the frequency with which people, coming from the lowlands, recovered from the disease in the mountains. Lombard, of Geneva, and others made the same observation in Switzerland. The consequence has been that mountain resorts have steadily gained in favour for the treatment of certain morbid states. Chief amongst these are early cases of tuberculosis in the young and in persons of fairly vigorous constitution, cases of malaria, certain disorders of the blood and of metabolism.

For a time there was a tendency to send to the mountains all persons affected with phthisis; but, as experience increased, the observation was made that all cases did not do equally well, and that in order to secure the best results discrimination was needful. The cases that did best were, as a rule, young, or, if middle-aged, with a certain vigour or robustness of constitution. People advanced in years and people of feeble circulation not infrequently failed to respond to the demands made by the cold climate and by the rarefied air. Another cause has contributed to the popularity of the mountains. Healthy persons who come with their invalid relatives are, as a rule, delighted with the brilliant sunshine and the cool air in summer, or with the equally brilliant sunshine and crisp dry air of winter with its manifold sports.

Before we go into the physiological and therapeutic action of mountain climates we must glance at their meteorological characteristics. The first and most important point to notice is that the barometric pressure falls as we ascend. This diminution in pressure is with some variations the same at any given elevation above sea-level, whether close to earth, as in mountains, or away from the earth, as in a balloon ascent. The lowered barometric pressure carries with it lower tension of oxygen in direct proportion.

Corresponding with the lower barometric pressure there is a fall in temperature. The fall in temperature is fairly regular in a balloon ascent, but in the mountains is subject to the disturbing influence of the earth.

The humidity of the atmosphere being dependent on two circumstances—the supply of water and the temperature of the air—is liable to a double set of disturbing influences. Currents of air charged with moisture carry water copiously to distant regions which otherwise would be parched and barren. Warm currents in ascending become cooled, and the water they contain is at the same time condensed out either as rain or as snow. Thus it happens that the water vapour is collected chiefly in the lower layers of the atmosphere and that the upper layers are comparatively dry. Only about one-tenth of the water of the atmosphere lies above a level of 6,500 metres.

Owing to the absence of water vapour the heat rays of the sun pass more freely at high altitudes—the diathermancy of the air is greater. This is the case also with the light rays and with the chemical rays.

To sum up: mountain air differs from lowland air in being rarefied, in being colder, in having a lower absolute humidity, and in offering less resistance to the sun's rays.

Snow, with which the high Alpine resorts are covered in winter, appears to be radio-active, especially freshly fallen snow. The physiological action of rarefied and of compressed air was first systematically investigated by Paul Bert. Amongst the host of able men who since Bert's time have worked in the same field, N. Zuntz, A. Loewy, A. Mosso, Regnard, Kronecker, Jacquet, Egger, and Abderhalden deserve special mention. Recently there appeared in Germany a great work on the subject, a worthy successor of Paul Bert's *Pression barométrique.*[1]

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[1] *Höhenklima und Bergwanderungen in ihrer Wirkung auf den Menschen. Ergebnisse experimenteller Vorschungen im Hochgebirge und Laboratorium.* Von A. Zuntz, A. Loewy, F. Müller u. W. Caspari. Deutsches Verlagshaus, Bong & Co., 1906.

All observers agree that at great altitudes the circulation and the respiration are quickened; but the extent to which this quickening takes place is very different in different people. One explorer in Central Asia, Wood, counted his pulse whenever he registered the boiling point of water, and found that the pulse rate was a kind of living barometer, by which a man accustomed to observe himself might at great altitudes roughly calculate the height. Another explorer, Henderson, found that on himself altitude had comparatively little effect. Even at 19,600 feet he never felt much discomfort—nothing more than a certain shortness of breath after exercise, and on waking up at night a feeling of suffocation, which generally passed off after a few deep inspirations. The symptoms with several members of the party were more serious and sometimes alarming. Professor Kronecker's pulse, resting at Zermatt, 1,600 metres (5,249 feet), was 64; on the Breithorn, 3,750 metres (12,304 feet), resting it was 80 and in motion 120.

The cause of quickened circulation and respiration at high altitudes has been the subject of much discussion, but the generally accepted view is that the more rapid action of heart and lungs is an effort of the organism to compensate for the diminished supply of oxygen.

Commonly the symptoms due to high altitude pass off in a little time—perhaps in a week or fortnight. Independent examination throws light on the process of acclimatisation. P. Bert found that the blood of animals that had lived in the Andes at great elevations absorbed a much larger quantity of oxygen than was the case with lowland animals of the same kind. Subsequently Viault noticed that in the Cordilleras, at an altitude of 4,392 metres (14,410 feet), the red-blood corpuscles amounted to 8,000,000 per cubic millimetre as compared with 5,000,000 at sea-level. Then Egger, at Arosa, 1,800 metres (5,906 feet), found an average of 7,000,000 in ten healthy men. The results of later observers have, with a few exceptions, tended to show that the number of the red-blood corpuscles increases more or less regularly with the altitude. This increase has been ascribed by some investigators to a diminution of water in the blood, owing to increased transpiration and evaporation in the drier air of the mountains. But this supposition, itself unproved, is rendered improbable by various circumstances. No increase of the white cells has been noted in the mountains. The hæmoglobin usually increases in amount, but, as a rule, rather later than the red corpuscles. The increased number of the red cells persists for some time after the return to the lowlands. Professor Jacquet, in Basle, and Dr. F. Suter, in Davos, made a joint research on the blood of rabbits. Nine rabbits were sent from Basle to Davos, and, after four months, were returned to Basle, where they were bled to death. The blood of these animals, as compared with the blood of eleven control rabbits kept at Basle, showed an increase of 13·25 per cent. of red-blood cells per cubic millimeter of defibrinated blood and an increase of 9·37 per cent. of hæmoglobin. In a subsequent research, Jacquet kept rabbits, in Basle, in air artificially rarefied to correspond with that at the altitude of Davos. After four weeks, their hæmoglobin amounted to 6·7 grammes per kilo. as compared with 5·5 grammes in the control animals, a gain, that is, of 1·2 grammes per kilo. Other observers have obtained similar results. The experiments of N. Zuntz, A. Loewy, F. Müller, and W. Caspari are especially instructive. Two young fox-terriers were kept under observation at Berne (1,312 feet above sea-level), and two others of the same litter on the Rothorn, at 7,060 feet. Full-grown dogs were also kept at both stations. An increase, though slight in the case of the older animals, in the number of red-blood corpuscles was noted in all the animals at the higher station. The hæmoglobin in the blood of a fox-terrier at the higher station was 12·99 grammes per kilo. of body-weight as compared with 10·78 in the blood of a similar animal at the lower station; that is, 20·5 per cent. more at the higher station.

When the animals were killed the bone-marrow of the young fox-terriers that were kept at the higher station was red, showing the persistence of the blood-making function up to the time of death; but in the dogs of the same litter kept at the lower station the bone-marrow was yellow with fatty changes, showing that the blood-making function had ceased or greatly diminished.

The same observers noted a remarkable contrast in the rate of growth of the young animals at the different levels. Increase of weight took place more rapidly and went on to a greater extent in the growing dogs at the higher than at the lower station, the animals in both cases being allowed to run about and to eat as much as they liked.

The influence of diminished atmospheric pressure on metabolism has been the subject of much experiment. One might expect that tissue change would be lessened by diminishing the supply of oxygen, and made greater by increasing the supply. This, however, is not the case. The activity of the internal oxidation is within wide limits determined by the needs of the tissues, not by the abundance of the oxygen. With the lower tension of oxygen at high elevations there is, as a rule, actually an increased rate of metabolism—at least, of fats and of carbohydrates. After the return, even from medium altitudes to the plains, the oxidation processes often sink below the normal for a considerable time. Zuntz and his fellow-workers observed a remarkable effect of altitude on nitrogenous metabolism. They found that there was a tendency to diminished oxidation of nitrogenous substances; and that some storing of proteid in the tissues occurred. They say: "We see, therefore, that the mountains exercise a quite characteristic influence on the balance of the most important organic material in the organism, and that in the mountains, up to certain heights, which vary for different individuals, the adult reacts similarly to the growing organism in ordinary circumstances. In this fact the saying about the rejuvenating action of a stay in the mountains finds its exact expression." Another curious and remarkable influence of altitude observed by Zuntz and his companions was the effect on the body temperature. A rise of temperature occurred at the higher elevations in nearly all members of the party. The rise varied considerably in different instances, and in some cases it persisted after the return to the lowlands. It appeared to be independent of the amount of exercise; and it did not seem to be definitely related either to mountain sickness or to the activity of tissue change.

From this sketch of the physiological action of high altitudes, we see what a powerful therapeutic agent is at our disposal. We see also why the mountains are suitable for some cases and unsuitable for others. Children and young people still growing are especially likely to benefit by the impetus given to growth and to the blood-forming organs.

Older people, for whom more active tissue change would be advantageous, will also profit by a stay in the mountains, provided that their organs of animal life—the organs of circulation, respiration, and digestion—are sufficiently vigorous to respond to the call that will be made on them to do more work.

In regard to this proviso children hardly ever fail; but in regard to people of middle or advanced age, the question must be carefully weighed, and sometimes it can be determined only by trial.

The principle just laid down gives the broadest indication for the selection of cases. Children and young people get on well, almost no matter what may be amiss with them. Perhaps the only exception is in the case of children with a congenital excessive irritability of the nervous system.

Amongst the more special indications for residence in the mountains are anæmia, the debility following fevers, malaria, tuberculosis, especially pulmonary tuberculosis, pleural thickening, deficient expansion of the lungs, bronchial asthma, and neurasthenia.

The most important contra-indications are uncompensated valvular disease of the heart, extensive and advancing disease of the lungs, excessive impairment of the aërating surface of the lungs, as in emphysema, and the severer forms of anæmia.

Each of these indications and contra-indications requires a few words.

All forms of anæmia usually do well in the mountains. In the severer forms, however, the breathlessness at great altitudes is apt to be distressing. Malaria and the debility following fevers seldom fail to disappear in the mountains.

The mountains have a special reputation in the treatment of tuberculosis; and the reputation is well founded. The disease is less prevalent at high altitudes than in the lowlands of any given country. This has been established for Switzerland; and, so far as defective statistics warrant an inference, it appears to be the case generally. The mountains are particularly suitable for early pulmonary tuberculosis in young subjects. Acute inflammatory conditions and very actively advancing disease are not, as a rule, favourable cases for the mountains. The more sluggish forms of the disease usually do best. In all cases, however, the general condition of the patient and his power of response to the demand for a more active rate of metabolism are the most important considerations. Elderly people with much bronchial catarrh usually do better in a warmer and less dry climate. Cases marked by frequently recurring hæmorrhages from a cavity are better in the lowlands; but simple blood-stained expectoration or occasional small hæmorrhages do not form a contra-indication for the mountains. Pleural thickening and deficient expansion of the lungs are likely to be benefited by the deeper breathing required to compensate for the smaller supply of oxygen. Bronchial asthma even with much emphysema is almost invariably relieved. Neurasthenia consequent on overwork or on a previous illness is usually benefited in the mountains, provided that the main organs of animal life are equal to the higher rate of metabolism that will be called for.

The high Alps are, as a rule, unsuitable for chronic kidney diseases and for chronic muscular rheumatism. Rheumatic fever is remarkably rare in the high Alps. Vigorous people, especially the young, with a gouty tendency, commonly derive great benefit from a stay in the mountains.

Only within the last thirty or forty years has the value of mountain air as a therapeutic agent become known. The growth of Davos, St. Moritz, Arosa, Leysin, and other Alpine resorts testifies to the popularity of high altitudes, both as health resorts and as pleasure resorts, and equally in summer and in winter. Each resort has special characteristics. Davos has three classes of visitors. Some seek only health; some only sport; some a change and rest from their ordinary occupations. All the year round there are visitors in search of health. From July to September, and again in December, January, and February are people who seek merely rest or pleasanter climatic conditions than they have at home. From the middle or end of November till the end of February, or it may be till the end of March, the place is thronged with visitors in search only of the winter sports—tobogganing, bobbing, ski-ing, skating, curling, or clay-pigeon shooting. Some occupy themselves with music, some with painting, and some with photography, while a certain contingent study one or more of the many languages that are to be heard in the streets. The many-sidedness of Davos is indeed its characteristic mark.

Davos is well provided with hotels and boarding-houses to suit every purse. There are a great many sanatoria, including excellent establishments for German, Dutch, and Swiss patients of small means. The Queen Alexandra Sanatorium for patients of small means of English-speaking nationalities will, it is hoped, be open in the autumn of 1909.

The sanitary arrangements in Davos are good. There is a system of main drainage, and the utmost care has been taken to obtain an adequate supply of pure water.

In regard to the question of infection by tuberculosis at resorts where persons affected with the disease congregate, it may be mentioned that Davos is the only one where strict regulations are in force to prevent risk. The danger in any case is small, and is practically absent where ordinary care is taken, and where spitting about is avoided. Nevertheless, bedrooms that have been occupied by patients suffering from tuberculosis should, as a matter of routine, be disinfected. Were it not for the occasional gross negligence of patients such a rule would not be needed; but in view of what people are the rule should be adopted as a matter of principle. Davos is as yet the only resort, so far as I know, where such regulations are carried out. In many resorts the excuse is made that no invalids are taken—a statement that is very seldom, if, indeed, ever, in accordance with fact.

Several small spots—dependencies of Davos they might almost be called—must be mentioned. Clavadel, two or three miles from Davos, and about 300 feet higher, offers, apart from its excellent sanatorium, good though somewhat modest accommodation. The Schatzalp Sanatorium, at an elevation of 6,200 feet, lies immediately above Davos, with which it is connected by a funicular railway. Klosters, 3,970 feet above sea-level, about an hour by rail from Davos, is a quiet and picturesquely-situated village. In summer it is thronged with Swiss and Germans. In winter it is a sort of English sporting appendage of Davos. Wiesen, about two hours' drive from Davos, is a quiet place about 400 feet lower than Davos. Seewis, at 3,163 feet, is a quiet, comfortable resort above the Davos railway line. It is open only for the summer.

St. Moritz is not less well known than is Davos. St. Moritz-Bad lies at an elevation of 5,804 feet above sea-level, and St. Moritz-Dorf nearly 300 feet higher (6,090 feet). The climatic characteristics are much the same as at Davos—clear, cold, dry, rarefied air, with a strong sun. Apart from its greater elevation, the most marked difference is the greater amount of wind at St. Moritz. St. Moritz is a much gayer and more fashionable place than Davos, and does not provide to the same extent for people who are ill. In the summer season, from June 15 to September 15, it is crowded with tourists, holiday-makers, and persons somewhat run down in health. Its neighbours, Pontresina, Sils Maria, Maloja, Celerina, and Samaden, are in the summer months almost equally popular, and hardly, if at all, less fashionable.

Arosa is another resort in the Grisons which has grown greatly in favour within recent years. It lies at an altitude of from 5,740 to 6,070 feet. It presents on a smaller scale the same social, invalid, and sporting features as Davos.

Grindelwald, 3,468 feet above sea-level, is most picturesquely situated. Though rather hot in summer, it is crowded with tourists. In winter its visitors are mostly of the class that prefer sunshine and the dry, crisp, still air of the mountains, with skating, ski-ing, and other outdoor sports, to the damp, cold, and feeble sun of the British Isles.

Château d'Oex, 3,261 feet, is a quiet, pleasant place, but hardly suitable for people that are seriously ill. Leysin, 4,757 feet above sea-level, consists chiefly of excellent sanatoria. In one of these sanatoria patients are received on terms only a little above cost price. Montana has a beautifully situated sanatorium, 4,960 feet above sea-level. Adelboden, at 4,450, and Kandersteg at 3,835 feet, are visited chiefly by tourists in summer and by fugitives from murky skies in winter. Les Avants, at 3,232 feet, is charmingly situated above Montreux, and often suits well invalids for whom the altitude of Davos is too great. Caux is visited by persons who are not very seriously ill.

Many other places in the high Alps might be mentioned that are much in favour for a summer outing; and year by year an increasing number of these keep open during the winter season.

THE THREE ESTORILS.

"THE PORTUGUESE RIVIERA."

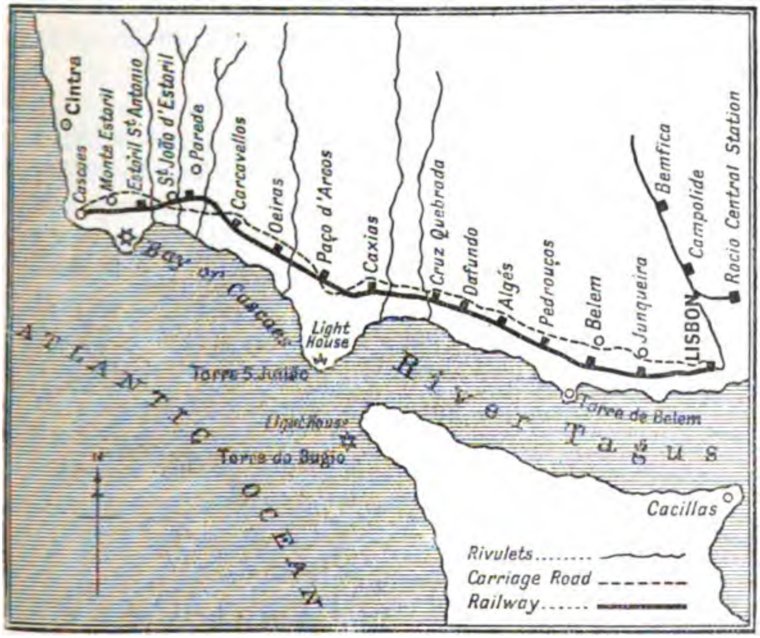
By G. H. BRANDT, M.D.

COMING from the north, as one's ship rounds the Cape Raso to make for Lisbon, and at about 12 miles from the Cape, one enters the River Tagus, passing through one of the two bars between the lighthouse towers of St. Julião and Buzio. These 12 miles of sloping land are studded with lovely gardens, picturesque villas and hotels, communicating with each other by well-made roads. We first pass Cascaes, with its bay of blue waters, known to the Phœnicians, Carthaginians, Romans, and Moors. After this comes Monte Estoril, St. Antonio d'Estoril, and St. João d'Estoril. These three little parishes have been for centuries renowned for purity of air and warmth and equability of climate. No more practical proof of its genial qualities can be adduced than that the monks have ever established their monasteries in the locality. The Franciscans built one in 1527, dedicating it to St. Antony, and in 1597 the Carmelites established themselves in one at Cascaes. The mineral-water springs found at St. Antonio d'Estoril and at St. João d'Estoril were used by King Joseph about 150 years ago.

The geographical position of the Portuguese Riviera perhaps renders its climate fit rather for contrast than for comparison with that of the Riviera di Ponente and the Riviera di Levante. These latter are struck by cold northerly winds coming from the snowy Alps, whereas these winds have lost their sting by passing across 300 miles of the Iberian peninsula before reaching the Estorils, at the extreme south-western point of Europe, and even then the serrated hills of Cintra furnish an additional protection. Again, the Gulf Stream passes up this coast, and a part of it runs into the Tagus, so that the special qualities of equability and warmth are further guaranteed.

Another point of contrast between the Portuguese and the Franco-Italian Rivieras is that the south-west winds blowing from the Atlantic are more refreshing than the winds from the corresponding quarters coming from the tideless Mediterranean.

The sudden changes of temperature, and the dampness, which one feels on the Italian and French Rivieras as the sun dips, are not felt here. The mean daily temperature at Monte Estoril is about 54° F. in winter, while that at St. Antonio and St. João d'Estoril is about a degree higher, owing to their being closer to the seashore, and at a lower level than Monte Estoril, and therefore more sheltered.



The vegetation all along this coast is most luxuriant. Different kinds of mimosas, pittosporums, magnolias, daturas, etc., fill the air with their perfume. Rows of huge palm-trees decorate the roads, and among the numerous sweet-scented flowers one sees the poinsettias throwing out their scarlet petals and golden centres in profusion. On the French Riviera this flower is raised in hothouses!

To sum up: the warm and equable temperature, the low degree of humidity, the number of sunny days, the purity and abundance of potable water, the refreshing breezes, and last, but not least, a complete system of drainage, make this coast an ideal winter resort. Another very important point is its proximity to Lisbon, which one can visit by means of the excellent train service in half an hour.

The abundance of mineral waters of very great value, which supply two bathing establishments, much frequented by visitors from all parts of Portugal during the summer months, is a great addition to this health resort. They are chiefly used as baths in cases of skin affections grafted on a gouty constitution, or for persons of a scrofulous diathesis. The results which I have for many years witnessed are so decided that I have no hesitation in saying that I consider them as the true specific in the cases above mentioned.

After studying this climate personally, and obtaining the opinion of some of our colleagues, I have come to the conclusion that these springs might be made use of in winter ; in fact, this is the only health resort in Europe where a thermal cure could be suitably carried out during the winter season. I know of some watering places where the summer temperature is often inferior to the winter temperature here, so that baths and inhalations are taken under less favourable conditions.

I hope I have convinced the reader of the importance of the Estorils. They offer at the same time a unique winter climate and abundant facilities for mineral-water treatment.

In summer these resorts are thronged by people who seek for change of air, sea and mineral-water baths.

I wish to express to Dr. D. G. Dalgado, who has resided for several years at Monte Estoril for the benefit of his health, my best thanks for valuable information on the climate of that health resort.

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GIBRALTAR, ALGECIRAS, RONDA.

BY WILLIAM TURNER, M.A., M.D.

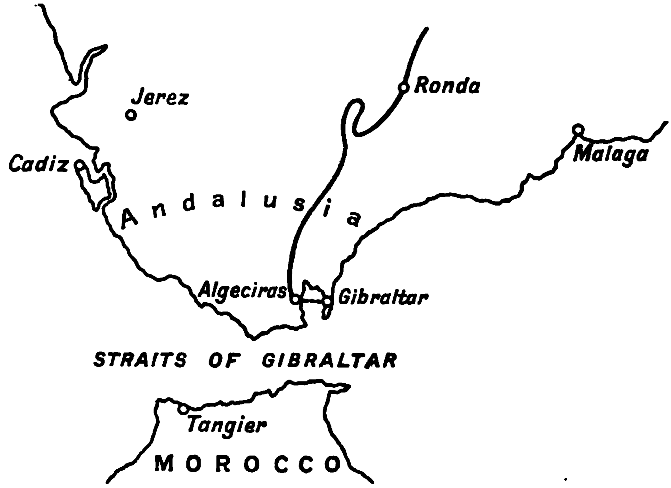
THE winter health resorts of Andalusia, the most southern portion of the Spanish peninsula, are rapidly assuming an important place in the reckoning of British climatologists, but so little comparatively is known of them by the generality of British practitioners, and so much has been done of late years to render this part of Spain accessible to visitors, that, in a work like the present, it seems desirable to include some account of these resorts as they stand at the present day.

Since the days of the Peninsular wars, when the south of Spain was overrun and devastated by Napoleon's armies, the portion of territory represented by Andalusia was left severely alone and had made little progress until some 35 years ago, when a line of railway was constructed by which Seville and Cordova and the north were brought into easy communication with the important town of Malaga on the south coast. But it is not more than 18 years ago since the still more important step of connecting the vicinity of Gibraltar by rail with Ronda, Malaga, Seville, Cordova, Granada, etc., was realised, and it is mainly in consequence of this innovation, which is purely a British concern, that southern Spain has risen so rapidly into prominence as a winter health resort.

The same British enterprise which provided Andalusia with this beautiful picturesque railroad has also called into existence two of the most luxurious hotels in Spain. These are the Hotel Reina Cristina at Algeciras, and the Reina Victoria at Ronda; the former of which, it may be remembered, was the rendezvous of the International Conference on Moroccan affairs in 1907; and the latter, which has only just opened its doors, will undoubtedly prove a favourite mountain resort for winter visitors and invalids as well as a grateful retreat in summer for the inhabitants of Gibraltar, Malaga, Seville, Jerez, etc.

A reference to the sketch overleaf will indicate the situation of the various points of interest in the locality, and their relative position with regard to each other and to the Straits and Bay of Gibraltar.

The following remarks refer only to the three resorts which mainly concern British travellers and visitors, namely, Gibraltar, Algeciras, and Ronda. These are the localities where a more or less prolonged stay may be made by those in quest of agreeable winter quarters in southern Spain, whilst they may also serve as starting points for tourists who wish to make excursions into the interior of Spain.



Gibraltar ("Gibel Tarik," meaning in Moorish the Mountain of Tarik), or Mons Calpe, forms one of the Pillars of Hercules, which, together with its fellow "Gibel Mousa," or Apes Hill, on the Barbary coast, constitute the eastern entrance to the straits. It is situated in 36° 8′ N. latitude, 5° 26′ W. longitude.[1] Gibraltar may be described as a bold headland jutting insularly into the sea at the entrance to the Mediterranean.

It is a mere rocky ridge about 3 miles long, ¾ of a mile broad at its widest part, and runs nearly due north and south. At its north end, where a narrow sandy neck connects it with the mainland, it rises sheer to a height of nearly 1,400 feet; at its southern end it tails off to a cliff about 40 feet above the level of the sea. Its eastern face is mostly precipitous, uncultivated, and for the most part uninhabited. The western face slopes more gradually, and at its northern end leaves an almost flat bank of shingle on which the bulk of the town of Gibraltar is built. The buildings, however, extend up the shoulder of this western face to a height of 250 feet and have solid limestone rock for foundation. The southern half of the western face is less densely populated, and contains many villas, wooded gardens, military barracks, officers' residences, etc.

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[1] It is thus nearly in line of latitude with Algiers and Malta. It is 7° south of the Riviera, and 15° south of the Isle of Wight.

The rock is composed of compact limestone or grey dense marble. It is by no means barren, for it can boast of a wood of elegant stone pines, and a great variety of fruit trees, and other trees and shrubs which clothe the greater part of its western slopes. The flora of the rock are very abundant and varied, 456 species being indigenous. The olive, fig, lemon, orange, almond, vine, pomegranate, apricot, cherry, peach, loquat, pear, and apple flourish in its gardens, and even the date and banana grow, but do not ripen well there.

Although Gibraltar has been in possession of the English for over 200 years, it is only in recent times that much has been done to render it easily accessible and suitable for the accommodation of tourists and invalids. Formerly it could be approached only by sea through the much-dreaded Bay of Biscay, now, however, it can be reached in three days from London by land, *viâ* Paris and Madrid. Formerly the hotel accommodation was of a primitive order and very scanty; at the present time there are in the town at least three well-ordered hotels and several others of a less pretentious description. Of lodging-houses and pensions there are not many, but a few flats and villas may be secured if applied for early.

During the past 15 years great attention has been given to the sanitation of the Rock, and a large amount of money has been expended in its reform. There can be no reasonable doubt that to these reforms may be attributed the fact that Gibraltar is now one of the healthiest stations under British control. It may be positively stated that Gibraltar is exempt from malarious diseases, whilst the baneful "Rock fever," which once prevailed so abundantly, is now but rarely met with, and only in the autumn season.

There being no reliable wells or springs on the Rock, the inhabitants have to utilise the winter's rain for their domestic supply. The amount is now ample, owing to a new system of catchment. For sanitary purposes, another supply of a brackish water is pumped into the town from wells sunk in the sandy isthmus to the north of the Rock, and this supply is unlimited.

The following observations were taken at an altitude of 52 feet above sea level:—

Mean annual barometer pressure	29·98.
Mean pressure for the six winter months	29·99.
Mean annual temperature in shade	64° Fahr.
Mean shade temperature for six winter months	59·1° Fahr.
Absolute minimum temperature	36·8° Fahr.
Mean annual daily range of temperature	12·8° Fahr.
Mean relative humidity of air	70 per cent.
Mean amount of cloudiness (1–10)	4·2.
Average annual rainfall	32·22 inches.
Average number of days when rain falls	74.
Average number of days when fogs exist	1.
Average number of days clear sky	123.
Average number of days when sky overcast	65.

Snow never falls, and hail is rarely seen, at Gibraltar. The prevailing winds are east and west, and variations of these. The east wind is more prevalent during summer, west and south-west during the winter.

From the table above it will be observed that one of the important features of the Gibraltar climate is the unusual equability of the temperature. The fact that the Rock is practically surrounded by water suffices to explain this, the conditions closely resembling those of a gigantic ship in mid-ocean.

Another valuable characteristic of the climate is the remarkable intensity of the sunlight; or, as otherwise expressed, the unusual clearness of the atmosphere. There can be no doubt that in this respect Gibraltar stands very high. As a practical proof of this statement it may be mentioned that artillery officers, when engaged in night firing, find that the same searchlights which are required on English stations to illuminate targets at 2,000 yards distance, suffice to illuminate the same targets in Gibraltar waters at a distance of 8,000 yards. It follows from this observation that those ailments, which are found to derive benefit from powerful sunlight, are likely to be favourably influenced by the climate of Gibraltar.

The annual rainfall during the past 100 years averages 33 inches. The monthly averages are as follows:—

January, 4·86; February, 4·15; March, 4·89; April, 2·94; May, 1·82; June, 0·55; July, 0·02; August, 0·15; September, 1·23; October, 3·74; November, 5·70; December, 5·57.

Though the greater portion of the rain falls during the winter months, most of the downpour is during the night, and an entire rainy day is of very rare occurrence.

The diseases most likely to be benefited by a residence in Gibraltar during the winter months are those calling for a mild, equable, somewhat moist, but essentially sunny climate, such as pulmonary tuberculosis, especially the more chronic and dry forms, laryngeal and bronchial inflammatory affections. Convalescents from lung consolidations and pleurisy generally do well. Chronic interstitial nephritis, diabetes, and vesical catarrh are also amongst the ailments remarkably alleviated, and often cured on the Rock. Nervous affections, including spasmodic asthma, neuralgias, chronic rheumatism, and advanced organic heart diseases are not, as a rule, improved by this climate.

Algeciras.—In the extreme south of the province of Cadiz, and on the western shore of the Bay of Gibraltar, within 5 miles of the Rock, stands the historic Spanish town of Algeciras. It has a population of 15,000 and may be regarded as the market town for the southern portion of the province. There is no enclosed harbour. Its shore is open to the wash of the tides, and being of a sandy and pebbly nature, it is well adapted for bathing and other seaside recreations.

Until recently the land communication between Algeciras and the interior was very bad indeed. A few years have served, however, to change all this. The English railway, already referred to, has opened up to the traveller a most interesting and beautiful piece of country, and Algeciras, as the terminus of the railway, has taken its position as a base from which tours may be made to the various places of attraction in Spain.

So far as I have been able to ascertain, no reliable meteorological records have been kept at Algeciras. Its proximity to Gibraltar, however, is such that the figures given above in reference to the latter may, I think, be accepted as an approximation to the climatic conditions obtaining in the former. The same or perhaps a greater intensity of sunlight is met with here, and the deleterious influence of the east wind, which is experienced by a large proportion of the inhabitants of Gibraltar, is not nearly so marked at Algeciras. The Levantic cloud, which is apt to rest like a pall over the Rock during an east wind and cut off the direct rays of the sun from reaching its surface, rarely reaches Algeciras. The latter, therefore, must have the advantage of a greater number of hours per annum of bright sunshine. And of all factors which go to make up the essentials of a good winter climate for English people, it will be readily conceded that none are so important as abundant and powerful sunlight. Whether for the invalid recovering from acute disease, the sufferer from chronic wasting disorders of any description, or the subject of overwrought brain and nervous prostration, as well as for many other morbid states, sunlight, with its associated warmth, can generally be trusted to do more than all the resources of the Pharmacopœia.

But probably it is not so much by the sick as by the sound that Algeciras will be sought after as a place of residence in winter. Those who are disposed to spend whole days out in the open country, in shooting, in golfing, in foxhunting, in sea fishing, or in boating, to these also the luxuriance of the sunlight will be no less welcome.

It has been remarked, chiefly by those who have paid only passing visits to Algeciras, that there is little for visitors to do by way of diversion and amusement there. It is true that the hackneyed amusements of the Spa are not provided, but visitors can indulge in lawn-tennis, cycling, golf, picnicking in the woods, and, during the season, fox-hunting with the Royal Calpe pack three days a week. This last is a charming pastime, and is largely taken advantage of by the Algeciras visitors, although the Hunt has its headquarters in Gibraltar. There are also many interesting walks and rides within a few miles of the town for those who are able for such exertion. Those, who crave for greater excitement than Algeciras provides, may run over by steamer at any time to Gibraltar, and there be posted up in the latest events of the day, and witness whatever evolutions may be in progress within that busy and bustling fortress. The steamboat service between the two places is excellent.

But the chief merits of Algeciras consist in its restfulness, its unconventionality, its startling primitiveness, and the curious mingling of modern English modes of life with the simple yet piquant ways of the Spaniards.

As to the diseases likely to be benefited by residence at Algeciras, they are similar to those enumerated above in reference to Gibraltar. It must be remembered, however, that the Hotel Reina Cristina at Algeciras is far more restful and luxurious than any hotel in Gibraltar. It is built in extensive and well-kept gardens. It has only two floors, and the staircases are so gently inclined that they can generally be negotiated by the feeblest invalids, and there are many bedrooms to be had on the ground floor. Anæmia and chlorosis generally improve in a marvellous manner. Organic heart affections also are specially to be recommended for treatment here. Many cases of incipient phthisis, bronchitis, etc., have rapidly lost all trace of their complaint, whilst neurasthenias and cases suffering from brain-fag can take the rest cure under the most favourable and promising conditions.

Ronda.—Taking the train at the Algeciras Pier Station, one is transported in about 3½ hours to the hill station of Ronda. The country traversed en route is decidedly attractive and in parts quite beautiful; and, given a bright day, the run is thoroughly enjoyable. The town stands at a height of 2,400 feet above sea level, and, as approached by railway from Gibraltar, is seen to occupy a lofty ridge overhanging the small river which further down becomes the Guadiaro. Until the year 1892, Ronda could be approached only by a long journey of two days on horseback from Gibraltar, a journey which involved no little risk and roughing, brigandage being rife in these mountain passes down to a comparatively recent date. Since the railway was constructed, which connects Ronda with Gibraltar on the one side and Malaga on the other, the people have been alive to the prospect opened up to them. Many improvements in water supply, lighting, sanitation, roads, and accommodation have taken place. Only in the month of March of the present year (1908), however, has the new English Hotel Reina Victoria been opened at Ronda. It is a sister establishment to the Algeciras Hotel, and though not so large is built in the same style, and affords equal comforts.

Ronda is undoubtedly one of the most picturesque cities in Europe. It stands on a high plateau of porous conglomerate and limestone rock, from which plateau there is a sheer drop of about 1,000 feet to the bed of the river below. Surrounding it on the south and west is an extensive range of rocky mountains, and even on the north side the ground rises gradually for some distance, so that almost complete protection from wind storms is afforded. The air, whilst it is pure, dry, and peculiarly stimulating and invigorating, is mostly calm and mild. The contrast between the dry, bracing air of Ronda and the moist, sedative sea air of Gibraltar is very striking. Snow lies on the surrounding hills at intervals during the winter, and sometimes falls even in the town itself.

No systematic observations on the meteorology of Ronda have yet been made. The rainfall is low, and the number of rainy days even in winter is very small. The soil is exceedingly porous, so that after even heavy rain the surface will be dry within an hour of its ceasing. Ronda may be exceedingly hot in summer and very cold in winter, but both conditions are rendered less irksome by the peculiar dryness of the atmosphere. It is expected that it will enjoy both a winter and a summer season.

The class of invalids most likely to be benefited by residence in Ronda are (1) the phthisical, for whom the dry, crisp, bracing air, free from microbial taint, the high altitude, the powerful sunlight, and the freedom from high winds, are specially adapted; (2) the neurasthenics, who will be able to carry out the rest cure under ideal conditions; (3) sufferers from insomnia, and nervous prostration, and neuralgia; (4) convalescents from acute pulmonary affections and from fevers; (5) patients suffering from strumous and debilitating diseases generally; (6) some heart cases.

The sanitary arrangements at the hotel, which stands in its own gardens, and is well isolated from the town, leave nothing to be desired. The water supply also is abundant and above suspicion, being derived from mountains several miles away.

THE ITALIAN AND SWISS LAKES.

By E. C. HORT, M.R.C.P.

THE great attraction of the Swiss and Italian lakes, for those who are really in search of health, is that they there find an environment entirely free from the more aggressive characteristics of the "professional" health resort. The huge hotels, the superabundance of doctors, nurses, and bath attendants, and all the *personnel* and paraphernalia of the modern "Bethesda" are refreshingly absent. Here, in escaping from the weary revolutions of the social treadmill, one is not driven, in exchange, to watch those of the wheels of chance. Here are no depressing groups of "poitrinaires" morbidly comparing notes, no amateur pathologists, or valetudinarians given over to gloomy introspection. The bizarre atmosphere of Cairo, the *soi-disant* "club" life of St. Moritz, Monte Carlo, or Nice, and the parasitism of Biarritz and Homburg, are a forgotten dream, together with all the follies, as well as the rigours, of a Spa sojourn. It is because of their exemption from these and other similar features that the beautiful shores of Thoune and of Lago di Maggiore, to mention only two districts, hold so much of promise for the real invalid. In this happy land he will be bewildered by no jargon of "indications" and "contra-indications," or subtleties of climatology, and will hear nothing of sunset chills or storms of dust, of treacherous sea winds, or dangerous altitudes. There is, in fact, no region more admirably adapted than these lakes, north and south of the Alpine range, to be a quiet haven of rest for the creaking human barque. Unfortunately—perhaps one should say fortunately—only at certain seasons of the year can they be confidently recommended.

THE ITALIAN LAKES.

Among the Italian lakes there is none more beautiful or better adapted to the needs of the searcher after health than Lago di Maggiore. Dotted along its shores are many places which invite him by their varying and special attractions. The good water-side hotel, and a most beautiful view down the lake to Interlaken. Stretching away behind the village are meadows covered with flowers of every kind.

St. Beatenberg, on the north side, is a delightful station for the summer months. It is built on a ridge of the mountain overhanging the lake, about 4,000 feet above the sea. In the early summer months it is apt to be damp with mist, as the place is actually on the cloud line. Facing south, as it does, it is very sunny, and it has superb views of the mountains and lake. The air is remarkably pure and the nights are always cool. It can be reached either by steamer to Beatenbucht and then on by funicular, or by driving from Interlaken, a distance of 6 miles up a heavy gradient.

Interlaken, 2,000 feet above the sea, lies between the lakes of Thoune and Brienz. It is well suited for a stay in May and June, but later it becomes unbearably hot and overcrowded. It is a good starting point for Grindelwald, Murren, and more distant places.

On and above the lake of Geneva are many well-known resorts. Lausanne and Geneva cannot be recommended for any length of time, and are quite unsuitable in the winter. Montreux is too much frequented by the pleasure seeker to be of real value to the invalid. Its chief hotel is too near the lake, and is in the busy season too crowded and noisy. Les Avants, 3,000 feet above, is a good summer station, and is also much used in winter. Territet and Glion have little to commend them. Vevey is much quieter than Montreux, Caux, or Glion, and is an excellent place for a prolonged stay in early summer.

The lake of Lucerne is best avoided by those in search of health. Beautiful as it is, its climate is more than enervating, and in summer the place is much overcrowded, and has, in fact, become a kind of tea-garden to the large towns of Europe.

THE ITALIAN MEDITERRANEAN SEA COAST.

By MICHAEL FOSTER, M.A., M.D., M.R.C.P.

The climate of the Italian Riviera is so entirely bound up with its somewhat unusual geographical features, that a brief description of these is essential to the true understanding of its merits. Henry Bennett, the pioneer of Mentone, coined the phrase "a gigantic undercliff," which admirably summarises the geographical features. From Ventimiglia to Spezia a narrow strip of land, varying from two to three miles in width, stretches backwards from the sea to the mountains.

These spurs of the Maritime Alps rise tier upon tier from the sea until they blend with the main chain. This narrow band of comparatively level land expands in places into wider valleys, the basins of rivers, and at the head a defile leads through the gorges to the plain of Piedmont beyond. These mountains are the dominating factor in the climatic condition, the indraughts of cold air from the northern plains, caused by the presence of a warm sea, do not strike the coast, but come to their level far out at sea; in other words, except in the wider valleys it is under the lee of the mountains. The mountains, moreover, besides providing this protection, are absorbing heat from a powerful sun throughout the day, and radiating it again at night. Further, this region is warmed by an inland sea exposed to great sun heat, and owing to a curious natural configuration of banks, this warmed water is as it were held in, close to the shore. Consequently, it will be obvious that the natural configuration of the country confers upon it shelter from northern winds and the advantages of radiation from the mountains.

Mist and fog, though present on the high hills, never descend to the belt of sea-shore. A curious feature, moreover, is the almost entire absence of sea fog; the writer has observed this phenomenon on four occasions only in eighteen winters. Owing to the rocky nature of the soil and the strong sun heat, the atmosphere is very dry.

These natural features confer an amount of warmth, absence of damp and constant sunshine, not to be found elsewhere on the continent of Europe.

The rainfall is about the same as that of Greenwich, 25 inches, but owing to its concentration, the number of rainy days is much smaller. Thus Nice, from October to May, has an average rainfall of 17 inches falling on thirty days, while London during the same period has 9·5 inches falling on seventy-six days.

A similar contrast is furnished by the relative humidity, which varies from 65 to 70 on the Riviera as against 85 to 90 in London. These characteristics, in combination with abundant sunshine and a soil which dries with great rapidity, ensure a marked and pleasing contrast to an English winter. The daily variations between sun and shade temperatures, and occasional winds raising dust from the porous soil, are the inevitable concomitants of such a climate. The winds are for the most part easterly, blowing across the Gulf of Genoa from off the snow of the Apennines. The Mistral blows only on some five or six days during the winter. Though in some ways a discomfort, these winds, as the late Dr. Poore pointed out, are not without compensating benefits, acting as scavengers of the closely packed native towns.

The contrast between sun and shade temperature is very marked, particularly in the winter months, and has to be carefully guarded against by the invalid. More especially is this the case at sunset, when there is a very rapid fall of temperature, a fall of as much as five degrees in ten minutes. In former days this sudden chill was regarded as having some strange malign influence, akin to a miasma. Consequently the invalid was shut up with closed windows from sunset onwards. Further experience has shown that, with due care as to additional garments, this chilly period forms no drawback to an open-air cure. Thus many patients undergoing open-air treatment are kept for the whole twenty-four hours on balconies, irrespective of this sudden sunset chill, and in no instance have they caught cold.

The physiological effects of the climate may be regarded from two aspects—the absence of depressing influences, such as fog, gloom and damp, and the positive effect in producing a sense of activity and well-being. The main effects of the climate are exercised on the nervous system; in popular language it is described as exciting. Sleeplessness is a not uncommon complaint on first arriving, but, as a rule, it passes off after a certain period of acclimatization. Most persons feel invigorated both in body and mind.

The Riviera first came into prominence as a health resort for phthisis in the early sixties of the last century. Other climates, and above all sanatorium treatment at home, have largely diminished the number of consumptives coming to these shores. Moreover, the accommodation for the consumptive invalid according to modern methods of treatment is strictly limited. The larger hotels have very generally closed their doors to them. There remain only one or two nursing homes and a few hotels which definitely make arrangements for invalids.

The class of case, which derives striking benefit, is the one that has become partially arrested under sanatorium treatment, but in which cold and damp increase the amount of sputum. Fibroid cases derive great benefit; and, in those complicated with albuminuria, it is remarkable to observe the diminution in the amount of albumen and improvement in general condition. It is essentially the partially arrested case, with dilated tubes, fibroid lung, and still a little cough and expectoration, that derives the most benefit. Many of these pass several winters able to lead a fairly normal life. The type of case with very rigid chest walls, which, as Dr. Huggard has pointed out, very rarely does well in the High Alps, generally improves very much on the Riviera.

As regards laryngeal tubercle, improvement may be expected wherever systematic supervision can be thoroughly carried out, and the value of such a regimen is much enhanced by the milder conditions both locally for the larynx and generally for the enfeebled vital powers.

Chronic bronchitis is benefited by the dryness of the air and the absence of mist and fog. In these cases the greatest care must be exercised in avoidance of wind and above all of rapid changes of temperature.

Asthma is capricious, and it is impossible to foretell to what extent it will be benefited. Old cases with much bronchial catarrh for the most part benefit markedly. Any asthmatic case should be recommended to choose a dwelling place as high above the sea as possible. Diseases of the heart benefit largely from the possibilities of rest in the open air, and the lessened liability to intercurrent bronchitis.

Under the name of rheumatoid arthritis are grouped probably many forms of progressive arthritis of diverse origin. For the purpose of this article, however, the disease must be regarded as presenting a clinical picture of progressive arthritis with bony changes, occurring in cachectic individuals. In these cases marked benefit is derived, from the possibility of resting in the open air, by supervision in the way of diet, and other therapeutic measures. Viewed in regard to its influence on rheumatic pains, it must be admitted that it is impossible to predict what the first effect of the Riviera climate will be —some cases are benefited at once—others are aggravated, but with patience and rest in the open air, the pains will gradually decrease.

Gout is benefited by the open-air life, and freer action of the skin, while in elderly subjects convalescence is much more rapid than in England.

Organic diseases of the nervous system benefit by the absence of depressing influences, such as cold and damp, and from the fact that patients can devote their whole time to a definite regimen. Functional disease of the nervous system is benefited only in so far as there is a possibility of an open-air life with bright sunshine and absence of the depressing influences of fog and mist. It must be borne in mind that when sleeplessness is a marked feature the climate is entirely unsuitable.

Turning to the individual resorts, the geographical features of the country make the essential difference in the climate of one place as compared with that of another. A series of bays, one of which may face more east or more south, or be to a greater or less extent under the lee of the mountains, involves great differences of climate. Side by side there may be a wide valley with a pass down which the northern winds sweep, and a sheltered sun-trap close under the shelter of the mountains. According as the place has a greater or less southern exposure so will it be to a greater or less degree warm or cold.

Leaving Ventimiglia, the frontier town Bordighera is first reached. Here all the newer hotels and villas are well above the sea level facing full south, but somewhat exposed to the north and west. This renders it somewhat colder but more bracing than San Remo on the east and Mentone on the west. The accommodation is good,—there is a large English colony with all comforts in the way of nurses, etc., at hand. Ospedaletti, some three miles further east, faces full south and is undoubtedly one of the most sheltered spots on the whole Riviera. The number of hotels is not large, and the visitors are mainly Swiss and German.

San Remo, two miles eastward, again presents somewhat different features, the space between the hills and the sea is wider, and though the protection from the land winds is fairly complete, there is not the airlessness of the more closely protected place. It may be regarded as intermediate between Cannes on the one hand and Mentone on the other. There is ample accommodation in the way of hotels, nursing homes, etc., and it is the centre for many excursions. Farther eastwards, is Oneglia, not so well protected and, as a health resort, in its earliest stage. Some twelve miles farther on is Alassio, a long straggling town on the sea-shore, facing somewhat easterly, but rimmed round to the north by an amphitheatre of mountains. On the spurs of these hills, hotels and villas have been built where adequate protection is secured. Owing to its more eastern exposure, the air is sharper and more bracing than the more westerly resorts. Accommodation is good and the place possesses many attractions. The whole life is simpler and quieter than at the other resorts. From Alassio eastward as far as Genoa the configuration of the coast does not show any spot likely to develop into a health resort. Beyond Genoa is the Riviere di Levante, stretching as far as Spezia. The coastline inclines somewhat sharply southwards, and an appreciable change follows in the climate. The sunshine is the same but there is more moisture in the air, and this is shown by the changed character of the vegetation. Nervi, a short distance beyond Genoa, close under the lee of the mountains and with a full south exposure, is consequently sunny, warm, and sheltered. The accommodation is good and the place has become a very flourishing German winter colony. Farther on, the valleys widen, and the next resorts are Portofino, Santa Margherita and Rapallo, situated within easy distance of one another. Somewhat more exposed than Nervi, they are more bracing and provide a distinct change of climate from the Western Riviera.

Farther south there is no resort of any present importance to be met with. A curious interest, however, attaches to Pisa, as it was formerly, on account of the French Wars, the nearest spot to the Riviera accessible to our forefathers. Now all is changed, and it is no longer the Mecca of invalids. Beyond Pisa lies the Tuscan Maremma, and farther on the Pontine Marshes, wind swept and sun dried. Next, under the shelter of the mountains, comes Naples with all its transcendent beauty. Here the climate, though warm, partakes of the marine character, brilliant sunshine alternating with dull and rainy days. It is not suitable for the tubercular or bronchitic, but eminently adapted for the neurasthenic or overworked, on account of its many and diverse intellectual interests. In the immediate vicinity of Naples are Castellamare, Sorrento, and the Island of Capri, delightful in the early spring and autumn but not sufficiently sheltered for winter resorts. A little farther south, on the Bay of Salerno, lies Amalfi, equally delightful and far more sheltered.

This is the most southern point of Italy where good accommodation can be found.

Turning to Sicily, we find it warm owing to its southerly position, but being an island subject to very rapid changes of weather. It is full of antiquarian interest, as no century from the early Greek Colonies is unrepresented by relics of singular beauty. For the neurasthenic or overworked, no more interesting country could be found, but for the pulmonary invalid, whether bronchitic or tubercular, the climate is far too changeable. The main resorts are Palermo, a large city full of interest, Girgenti with its famous temples, Syracuse with its theatre, and farther south, Taormina with its famous view of Etna and the Ægean Sea. This completes the list of Italian Mediterranean health resorts.

HEALTH WITH PLEASURE IN NORWAY.

By P. HEYWOOD HADFIELD, M.A., L.R.C.P.

NORWAY is a narrow, exceedingly mountainous tract of land. Radiating from the mountain plateau of its interior towards the sea are steep valleys, which end in deep cañons or fiords, filled with the waters of the Atlantic Ocean. These fiords extend for many miles into the interior, where they ramify by dividing and subdividing: their shores are sometimes formed by the bare, precipitous sides of mountains several thousand feet in height, sometimes by gentler tree-clad slopes. The width of the fiords is never great, but their depth allows of navigation by the largest vessels. Another special feature of the western coast is the barrier to the ocean formed by a chain of islands lying at a little distance from the mainland, and protecting the inner navigation channel from bad weather.

The southern end of Norway is in the latitude of North Scotland, but a third of its total length is contained within the Arctic Circle: in the same latitude are the shores ot icebound Greenland, a country which is not likely to be recommended to the British health seeker. But the wand of the magician is waved over the climate by the Gulf Stream, which flows up the shores, and pours its warm surface waters deep into the interior. The deep, cold currents of the Atlantic are prevented by the shallow North Sea from approaching the shore, with the result that the fiords, even in winter, are ice-free, and in summer time enjoy a climate closely resembling that of Great Britain. It is this high northerly position of Norway which is responsible for the long night of winter, as well as for that "Midnight Sun," associated with Norway in the popular mind. As a matter of fact, the sun at midnight is only seen north of Bodo, but in summer time, throughout most of Norway, there is almost perpetual daylight.

It is best to divide Norway into three sections. The northern, from Trondhjem to the North Cape, is rich in scenery, but the distances between points of interest are considerable, and the climate, although good in summer, is naturally colder than that farther south. The south-eastern section has no great wealth of fiord, and, with the notable exception of Christiania and its neighbourhood, has few attractions. It is the western part of the country, from Molde to Stavanger, which offers the best touring ground, from the point of view of accessibility: its numerous fiords and special sights are more closely concentrated, and they are at the same time more varied. The summer climate, notably around the Sogne Fiord, in July and August, is the best, with a mean temperature of 55° to 60°, and a possible maximum of 80°. It is with this western district that these notes will chiefly deal. The whole of Norway "enjoys" a heavy rainfall, but the average amount of sunshine is also large. In both temperature and rainfall this western country has the best record, especially in July and August. The air, even at low fiord levels, has the bracing effect of the sea-winds, without their strength, and the sparseness of population ensures its purity.

There are two ways to visit Norway. One is to take a steamer across and spend the time in independent travel; the other, to join a yachting steamer in England and continue the cruise in it through the fiords. Where health is a prime consideration, the latter is the preferable course. The independent traveller will have to make the voyage across the North Sea in a small steamer; landing, say, at Bergen, he will find excellent accommodation, but as he proceeds into the country the arrangements for his reception prove more primitive. The railway is of little use, and his journeys will have to be made by driving, or on the local fiord steamers. Away from the few great tourist centres the hotels, though scrupulously clean and steadily improving, offer no very great comfort; the native diet provides very little variety, and, so far as meat is concerned, is bad in quality. Invalid diet is not obtainable, and medical men are few and far between. A wet season makes such travel not desirable for anyone physically unfit for some amount of "roughing it." The fiord steamers will usually be found comfortable in a simple way, and very regular in their services.

Turning now to yachting cruises, my references will be to the large ocean steamers. It is on one of these, the "Ophir," that my experience has been chiefly gained. On such a ship the passage of less than 36 hours across the North Sea should have few terrors, even for the worst of sailors. Once arrived in Norway, practically the whole time is spent in land-locked waters, where even the motion of the screws escapes notice. From the time the traveller joins the steamer, he has everything planned out for him, and is free from the worries and cares of board, lodging, and travel. At each place of call, driving trips inland—sometimes extending over a night, the ship being rejoined at the next port—are arranged by a conductor; these the traveller may take if he wishes, or he may elect to wander at his own sweet will. In the evening and night the ship steams through the grand scenery of the fiords, while for most of the day she is anchored at spots selected for their especial beauties and interests. On such a ship the diet is, of course, excellent and varied, and the special food required by the invalid is available. A medical man always accompanies the steamer. In short, the advantage of the yachting method consists in the fact that one is transported through the best of the Norwegian fiords, from England to England, and provided with British comforts and attention. In 13 days the choicest part of Norway is visited, and stops allowing of shore-going are made at Bergen, Gudvangen (Næro fiord and Stalheim), Balholmen, Leen (Visnæs, Olden and glaciers), Merok (Geiranger fiord), Næs (Romsdal Valley), Odde (Lotefos and glacier), and Sand fiord.

The medical practitioner will wish to know which of his cases may be sent to Norway with good hope of benefit. Cruising in Norway is not desirable for the case which requires active spa treatment, or for the "acute" case. Neither can it be recommended for mental cases, but some neurasthenics, when accompanied by a suitable companion, may be expected to benefit. The man, who, well or ill, cannot be happy without the society of towns or the amusements of the Casino, can hardly expect to relish the voyage. Benefit in cases of insomnia is doubtful; for while the regular life in fresh sea air often works wonders in this condition, one must bear in mind the many noises inseparable from a ship, and that people, who have come away to enjoy themselves, are not early bed-goers. The patient, whom the cruise will the most peculiarly benefit, is the man suffering from worry and overwork. Such a one has nothing to trouble himself about on the ship, and need take no thought for the day or the morrow. Lastly, cases in which a voyage would be desirable, but is contraindicated on account of *mal de mer*, can get the one without the other in the quiet Norwegian waters.

What are the amusements and occupations? On the ship there is the society of one's fellow-passengers, deck games and sports, concerts, card parties, and dances—all or any of which can be participated in, or as easily avoided. The chief interest lies in watching the scenery. Ashore, there are driving excursions through mountain gorges, trips across lakes, visits to magnificent but easily accessible glaciers, or to great waterfalls. The country roads are good. The native vehicle is a small two-wheeled dog-cart, drawn by the sure-footed Norwegian pony, but for those who want greater comfort, four-wheeled landaus are usually to be obtained. Some people prefer to avoid set plans, and for these there are pathways by the fiord-sides awaiting exploration. There are often opportunities for fly-fishing in river or lake, or deep fishing in the fiord. The artist and photographer find each scene a fresh paradise. Mountaineering and rock-climbing devotees have no lack of opportunity, but there is no assistance to be derived from local guides.

A cruise occupies only 13 days, so where time is available it would be a good plan to take two consecutive cruises, remaining ashore in Norway for the few days occupied by the steamer in going to England and returning. Or, it is probable that during his cruise the traveller will have taken a special fancy to some spot, and there he may return for a more prolonged sojourn: such places there are at Balholmen, at Merok, near Visnæs, at a little hotel on the shores of Lake Opstryn, or near Odde, at an hotel which stands on a height overlooking the lake. These are places which have a special attraction for myself, but there are, of course, many others.

For a prolonged residence it would be hard to beat Holmenkollen. This is the health resort of Christiania, and is perched on the heights above the city, from which it is easily accessible by electric tram. Several excellent hotels and sanatoria, commanding beautiful views over Christiania fiord, are built among the pine woods crowning the hill.

A few practical hints will be of use. In booking a berth, the health-seeking passenger should spend a little more, and engage a room for his sole use. Inside cabins are unpopular, but should not be despised; they are quieter and often larger than those which possess a port, and on a well-ventilated ship have an ample air supply.

When ashore, remember to take a waterproof, and if driving, a rug. The costume should be that which would be suitable for country use at home. Often, after a climb up the mountain, a cold wind meets one on the summit, and there is always a great difference in the temperature of the sunny side of the fiord and that lying under the deep shade of the mountains. So err on the side of being too warmly clad—it is always easy to take a coat off—appearances are of no account in Norway! Off the main routes, and where visitors are not expected, the traveller will not find much to eat that he will appreciate; even the bread and cheese of the farm-house will not be quite suitable for his palate. Spirits are sold only at a few places specially licensed by Government, but the native beer, something like light lager, is easily obtainable, and is good. As the farmer's cow is often a goat, it is not always possible to get good milk. In the afternoon, even at the best hotels, it is wisest to take coffee—tea is not much used in Norway. Language, except when quite inland, presents no difficulty, for the Norwegians, whom the tourist is likely to meet, speak fair English.

I have now sketched the general conditions which a visitor to Norway in search of health will meet with. Routes and distances can be ascertained by reference to Baedeker.

In conclusion, I should advise the medical man, who has to compress his holiday within narrow limits of time, to try a cruise to Norway. In no other way can he obtain so much rest and change of scene at so moderate a cost.

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FRANCE.

SOME RENAL SPAS.

By LEONARD WILLIAMS, M.D., M.R.C.P.,
Physician to the French Hospital.

THE object of spa treatment is the furtherance of metabolism and the promotion of excretion. The former is encouraged by change of climate, of surroundings, of diet, and the like. The latter is stimulated, from the skin by baths, massage, and electricity, from the bowels by purgative waters and intestinal lavage. Curiously enough it is but a few of the spas which make any special appeal to the emunctories which are admittedly the most important, namely, the kidneys. Such spas exist, and have existed for a long time, but it is only within the last decade that their value in diseases and disorders, other than those of the urinary tract itself, has attracted any considerable attention.

The importance of the renal factor in spa treatment has been much emphasised by the modern views concerning the origin of gout, hyperpiesis, arterio-sclerosis, and kindred maladies. According to these views it is to the accumulation in the system of toxins produced by the inadequate metabolism of nitrogenous foods, or to the failure on the part of the organism adequately to excrete the products of normal metabolism, that these troubles are due. Inasmuch as the kidneys are the organs which are mainly responsible for the excretion of nitrogenous waste, it is to the spas which are known to exercise a flushing, depurating effect upon these organs that an appeal is now being made in the treatment of these conditions. It has long been recognised that many of the purgative spas, such as Homburg and Kissingen, exercised a diuretic as well as a purgative action, owing in all probability to the large amount of water ingested during the ordinary course of treatment. But the great majority of these waters contain a relatively large proportion of common salt, a constituent which has been shown by Widal[1] and others, so to militate against functional renal efficiency that in pre-disposed persons, in persons that is who, like the gouty, are troubled with a measure of renal inadequacy, it is possible by exhibiting the salt to produce dropsy, and to cause its disappearance by withholding the salt. Having regard to these facts it is evident that a natural mineral water, which contains chloride of sodium, cannot be regarded as a satisfactory vehicle for assisting in ridding the system of toxic principles which normally find exit by the kidneys.

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[1] *La Cure de Dechloruration.* (J. B. Baillierè.)

Attention came thus to be directed to those spas whose diuretic properties were under no suspicion of mischievous potentialities arising from the presence of common salt in their waters. The purgative element, which is admittedly helpful in such cases as those under consideration, could, it was found, very easily be supplied artificially, under substantially the same dietetic and general hygienic conditions as those which obtain at the salt-water spas, whilst the cutaneous stimulation of baths, massage and the like, could be applied as efficiently at the one as at the other. For these reasons a "cure" at certain stations, whose waters have hitherto been regarded as applicable only to diseases and disorders of the urinary passages, is now esteemed as the rational and physiological means of treatment in those metabolic troubles for the relief of which the purgative spas have become famous.

Of these stations, Contrexéville is, from the point of view of urinary and vesical disease, by far the best known. Since very early times it has enjoyed a great reputation in the relief and cure of uric acid, gravel, and vesical calculi, a reputation which would seem to be well deserved. Napoleon III., as is well known, suffered much from a vesical calculus, but owing to a conflict of opinion among his Parisian advisers, when the nature of his disease first became revealed, he was sent, not to Contrexéville, but to Vichy; and there are not wanting unbiassed physicians in France who, from their experience of the effects of a cure at Contrexéville, confidently assert that, had wiser counsels prevailed at that period, the fate of the second empire would have been a different one.

Contrexéville is not altogether an attractive place. Someone has even gone so far as to describe it as "a dirty village on a dirty stream," a description which is as far from the truth as the glowing eulogies, couched in ungrammatical superlatives, to which we are accustomed from interested quarters. The town is situated in the Vosges mountains at a moderate elevation (1,150 feet), and, like so many other towns of the same description, it is entirely given over to the season, which lasts from May to September, and to the details of treatment. The ordinary "cure" takes about three weeks. The hotel accommodation is very good, and the amusements are sufficient. Contrexéville is essentially a conservative station. It has for generations held the lead in disorders of the urinary tract, and it sees no reason, apparently, for making any appeal to a wider public. In the management of these disorders it is likely to retain its pre-eminence, for not only are the waters as efficacious as those of any of its rivals, but its physicians are men of very exceptional experience, who have made a special study of genito-urinary complaints.

Contrexéville is one of a group of three stations in the Vosges which are all within a very short distance of one another, of which all have waters of the same class (called earthy or calcareous), and all of which cater, substantially, for the same type of disease. The other two are Vittel and Martigny. These three stations, being neighbours and rivals, it is inevitable that they should from time to time have exchanged "feline amenities," which have become crystallised into the saying, now current among members of the profession in France, to the effect that Contrexéville is for the aristocrat, Vittel for the parvenu, and Martigny for the man of business. There is an undercurrent of truth in this gibe; for Contrexéville is unquestionably correct and starch-like to the point of boredom, while there is an air of obtrusive and newly-acquired opulence about Vittel which betrays its mushroom origin. Against Martigny the worst that can be urged is that it labours under the disadvantage of having neither the reputation of the one, nor the wealth of the other. It can and does, however, supply the "cure" efficiently and agreeably at a price which appeals to men of business.

Vittel is about three miles north-east of Contrexéville, than which it is slightly less elevated (1,100 feet). Its situation, however, is rather more favourable, inasmuch as it is on a hill, whereas Contrexéville is in a hollow. The waters and their physiological effects are very similar to those of its better known rival, but Vittel, being essentially a progressive station, is not content to rest its claims to professional favour upon a mere genito-urinary basis. It seems, on the contrary, to emphasise the efficacy of its waters in those general metabolic disturbances to which reference has already been made, more especially does it extol their value in hypertension and commencing arteriosclerosis. But Vittel is progressive not only in its therapeutic aspirations, but also in its recognition of the factors which make for prosperity in the modern health resort. There is probably no spa in any European country which has more fully realised its responsibilities in the matter of public and private hygiene, in that of the comfort and good management of its hotels, the equipment and efficiency of the means of treatment which it offers, as well as the amusement and occupation it provides for its visitors. All of these are matters of the utmost importance in which it is impossible too highly to praise the station.

Martigny, which is also close to Contrexéville, about five miles to the south-west, has an elevation of about 100 feet more than Vittel. It is pleasantly situated and well provided with hotel accommodation and amusements, which include very fair inland golf-links. The waters are used much in the same way as those at Contrexéville and Vittel, though the thoroughly progressive spirit of the latter can scarcely be said as yet to have reached Martigny. There is, however, no complaint whatever to be made against the station by those who are content to take things quietly, and who dislike the element of fashion and frivol which pervades some of the better-known continental resorts. As compared with its two neighbours, Martigny has at least one very distinctive feature. This is the possession of a spring which is in many ways comparable with that at Schlangenbad, which attracts, in consequence, large numbers of those who need a sedative as well as a depurative régime.

Another station which, on account of the composition of its waters, is commonly bracketed with the foregoing, is Capvern in the Pyrenees, not far from Luchon, which may be described as a health resort *in posse.* It enjoys a very considerable local reputation, but the nature of its accommodation and the type of its sanitation render it quite unsuited to visitors from this country.

At the other end of France, on the south side of the

Lake of Geneva, there are two renal spas which deserve more than a passing notice, namely, Thonon and Evian. The two are situated quite close to one another, and have waters which, both chemically and therapeutically, are practically identical. In other respects, however, they are very different.

Thonon is a small town of some local importance, with a market-place and a "mairie"; at one end, the lake end, of which has recently grown up a kind of suburban health resort. The efforts to elevate this portion into something worthy of the efficacy of the waters are very praiseworthy, and the time may not be far distant when Thonon will assume a high place among the French renal spas. That time is not yet, however, for although the waters are there in abundance, and the place is in the middle of the delightful scenery of Lake Leman, its accommodation, and its general note, are still distinctly and even depressingly "bourgeois."

From the point of view which we are considering, that, namely, of the solution of retained toxins and their riddance by the renal route, Evian must be regarded as the premier spa. Its situation, accommodation, and facilities for recreation and amusement render it an exceptionally agreeable place to visit. Its hygiene is all that the most exacting sanitarian can demand, while its equipment for the accessory means of spa treatment is as complete and luxurious as can be. The renal treatment of metabolic disorders may be said to have been created at Evian, and the marked success which has there attended this line of treatment has, naturally enough, perhaps, induced various other spas to follow so brilliant an example.

Among these, Aix-les-Bains must be given the first place. This station has for a long period justly enjoyed a world-wide reputation in the treatment of local arthritic conditions by the system of massage-douching which it originated. But the growing success of Evian, with its renal treatment, reinforced by its successful imitation of the Aix balneary methods, seemed to threaten in no inconsiderable degree the popularity which the older spa had so long enjoyed. It became necessary, therefore, that Aix itself should stoop to the position of imitator, and find a water which should rival that at Evian. This did not take long, for in that enchanted district springs well up as from the touch of a magician's wand. Within the last three years a spring, called the "Source des Deux Reines," has been discovered half way up Mont Revard, of which the most complimentary thing that its discoverers can find to say about it, is that the water is practically identical with that of Evian. Aix-les-Bains is now, therefore, no longer a mere arthritic spa, but disputes with Evian, Thonon, Vittel, and Martigny, the right to attract people for whose metabolic disorders renal flushing is indicated. In the matter of the general appurtenances of a health resort, Aix-les-Bains is above criticism. The only thing which it is possible to say against it is, that for some tastes it is too fashionable, and for some temperaments, too exciting. It is a miniature Paris in the Alps.

ROYAT.

BY J. EGERTON BRANDT, B.A., M.D.

THIS watering-place is in the department of the Puy-de-Dôme, at an altitude of 1,500 feet.

Looking downhill, and to the north-east, from the hotels and villas which cluster round the well-equipped bathing establishment, the view includes in the foreground the city of Clermont-Ferrand, at the foot of the valley, and a mile from Royat. Beyond lies the immense fertile plain (the Limagne), bounded in the far distance by the mountains of the Forez. Following the valley uphill, past Royat, one reaches the high tableland (3,000 feet), on which rises the chain of extinct volcanic hills, of which the Puy-de-Dôme is the highest (4,800 feet). All the region is of volcanic origin, the soil porous and fertile. The surroundings are very picturesque, the valley well supplied with excellent spring water, and highly cultivated with grain, vines, and fruit trees. The sides of the hills are richly wooded with chestnut, pine, and walnut trees, while the general contour is broken in all directions by heather-clad hills—remnants of prehistoric convulsions.

Owing to the volcanic origin of the soil and to its declivity, no dampness is possible. The peasants have to irrigate their fields, for rain-water does not lie long enough during the hot months to be efficient. The mean temperatures for the last 10 years, during the summer, are as follows :—

In May, 55·4° F.; June, 62·6° F.; July, 66·2° F.; August, 68° F.; September, 59° F.

The annual rainfall averaged during the last four years 744 mms. (including the winter months). Owing to the neighbourhood of the hills, thunderstorms are frequent in the summer, preventing any long-continued heat.

As regards the season, the weather in May is uncertain, and it is preferable for patients to come not earlier than the 1st of June, or later than the 25th of August, so that they will have finished their treatment by about the 15th of September. The average length of treatment is three weeks; but it is often necessary to shorten or lengthen it, according to the individual case. The climate during the summer months is warm, dry, and bracing. The nights are cool, as after sunset a westerly breeze sets in from the hills, and patients can sit out of doors, duly protected, with no fear of damp or dew.

Royat is essentially a quiet health resort, where the restoration of health comes before everything, but where anyone with a taste for archæology, botany, or geology will find plenty to occupy him.

The patients benefited are mainly those who suffer from manifestations of a *gouty* origin, such as articular pain, headaches, pharyngitis, dyspepsia, chronic bronchitis, asthma, or skin eruptions of gouty origin. The class of gouty cases referred to is that in which the patient is either anæmic or debilitated from some other cause, such as recent illness, overwork, late hours, and so on.

Another class which derives great benefit, more especially from the baths, is that of certain forms of cardio-vascular disturbances, of which the following are clinical types :—

(*a*) Functional cardiac insufficiency in cases of obesity, emphysema, chlorosis, or anæmia.

(*b*) Cardiac insufficiency (toxic myocarditis) resulting from certain fevers (scarlet fever, influenza, typhoid).

(*c*) Spasmodic contraction of the peripheral vessels, often seen in young women of a nervous disposition, who complain of cold extremities, chilblains, and, maybe, palpitation.

There are four springs, which differ from each other in mineralisation and temperature.

The principal feature of the baths is that they are given at the natural temperature and in running water. The three springs used for bathing vary in temperature from 96° to 80·6°; all three contain a large amount of free carbonic acid gas.

All four springs are used for drinking. The Eugénie, St. Mart, and César springs are warm alkaline and tonic waters.

The colder St. Victor water is ferruginous and arsenical, and is used only internally.

Local applications of the waters for treatment of the nose, throat, and bronchial tubes are constantly in use, as well as the various forms of massage and douches.

It will thus be seen that the treatment at Royat is an eminently tonic one; and that, if one usually advises an air cure before the patient returns home, it is mainly in order to break the transition between the regular hours and restricted diet and the opposite conditions which are so frequent in a town.

A train service (Orleans line) connects Royat with Bourboule and Mont-Dore.

MONT-DORE.

By J. EGERTON BRANDT, B.A., M.D.

This health resort lies in a wooded valley, 3,445 feet above sea level, and is, therefore, the second highest watering place in France. In July and August the mean day temperature is 57° F., the thermometer often falling to 40° F. at night. The low average is due to the cool mornings and evenings, for in the middle of the day it is often hot. The surroundings are rugged, the vegetation bears the imprint of high altitudes, and the general impression is one of wildness and grandeur. The sides of the hills are well wooded, and there is plenty of shade.

Mont-Dore has several springs, of which the largest and hottest has a temperature of 113° F. Their mineralisation is slight, the more important elements being silica, carbonic-acid gas, and arsenic, so that their well-earned reputation in certain complaints is due mainly to their thermal qualities. Their beneficial effects are supplemented by the fine mountain air and the excellent methods of treatment. The waters are used in subacute or chronic disorders of the respiratory system, of which the following are the chief:—

Chronic inflammation of the nose and throat; subacute or chronic laryngitis; chronic bronchitis and emphysema, or cases in which the bronchial tubes are particularly susceptible to cold; pure spasmodic asthma; also as a preventive agent in suspected pulmonary tuberculosis or in the earliest forms of the disease.

The principal mode of treatment consists in inhaling the mineral water converted into steam; this is carried out in special rooms, where patients remain for 30 to 60 minutes.

The hot springs are also used, in some cases, for bathing. As the temperature of the water varies from 105° to 111° F., only the lower part of the patient's body is immersed, and that for only a few minutes. Massage, breathing exercises, hot douches, and drinking the waters are valuable aids in remedying defects in the circulation, and as diaphoretic agents.

The resources for patients and their friends consist in excursions, riding, tennis, and croquet. By means of an electrical funicular railway, patients can spend part of the day among the pine woods at an altitude of 4,374 feet.

In the evening there are the casino, theatre, and music.

The sanitation and water supply are good.

Owing to its position the season at Mont-Dore is short, and it is preferable for patients to come between the 15th June and 15th August, spring and autumn weather being uncertain.

LA BOURBOULE.

By A. W. GILCHRIST, B.A., B.Sc., M.D.

THE waters of La Bourboule are remarkable for the large quantity of arsenic they contain. Thus, each glass of the source Choussy-Perrier contains the equivalent of four drops of Fowler's solution. The bath-station is situated at a height of nearly 3,000 feet above the level of the sea, and is surrounded by plateaux and hills which rise gradually to over double that altitude. The valley, which here marks the site of an ancient lake, expands rapidly as it runs from east to west, and, while adequately protected on all sides, is comparatively open to the south. The climate is comparatively mild, but, as in all mountainous districts, the weather is subject to sudden changes; there may be chilly nights even in August. During the hot days which may succeed each other uninterruptedly at midsummer, the temperature rarely exceeds 80° F. While the air is drier than at the sea-level, rain may be frequent and continuous. On the whole, however, the climate may be called agreeable, while it is usually considered tonic for the nervous system and invigorating for the circulation.

The surrounding country has always appealed to the pedestrian as wayward and beautiful, its rides and drives are attractive, and the motorist, for whom the higher lake district is now easily accessible, can be even enthusiastic in its praises. And how could it be otherwise when an afternoon excursion will take you past craters that seem to be ready for renewed activity, will show you frowning castles that still seem to dominate the picturesque mediæval villages, and will take you over ground for which, if you are English, your ancestors long contended, and which they once held as their own?

The water of La Bourboule is highly thermal—nearly 140° F. at its source—and in addition to the arseniate of soda, already mentioned (28 mg. to the litre), contains over 6 grammes of sodium bicarbonate and sodium chloride. It is used internally and externally, mainly for baths, douches, and inhalations. A new spring, the Source Croizat, containing 6 grammes of sodium chloride, will increase La Bourboule's already extended sphere of usefulness. Skin diseases have been at all times treated at La Bourboule. In order of suitability they can be classed as follows:—1. Pruriginous affections. 2. Lymphatico-scrofulous lesions. 3. Eczemas, especially the pruriginous. 4. Squamous affections, such as psoriasis. 5. Acne and furunculosis. 6. Chronic specific affections,—arsenic now, more than ever, being associated (as in Donovan's solution) with mercury in their treatment. The general diathetic or constitutional conditions underlying these affections are also benefited by the treatment. Thus La Bourboule is the "station of election for nervous and neuro-arthritic children who require a saline treatment and yet do badly near the sea." Those who have become or are what the French call "demineralised," the pretuberculous, are successfully treated at La Bourboule. Certain forms of bronchitis and emphysema (Graves and Trousseau always gave arsenic for chronic pulmonary dyspnœa) are benefited by the inhalations. Infantile asthma (adults go to Mont-Dore) often does exceptionally well. Naso-pharyngeal affections find a natural detergent and antiseptic douche in the waters. Diabetics who are losing too much nitrogen, *hyperhepatics*, as Professor Gilbert calls them, find advantage from this mixed arsenical treatment. Anæmias, essential, secondary or malarial, suggest themselves as susceptible of improvement for a similar reason, and even "those very troublesome cases of rheumatoid arthritis ' may be benefited from a tonic and hæmatinic like arsenic, generally well tolerated in the form it assumes at La Bourboule.

CHÂTEL-GUYON.

By A. E. E. REBOUL, M.D.

CHÂTEL-GUYON (1,300 feet) lies at the foot of the Monts-Dômes, in a little valley running from east to west. The surrounding hills, covered with vineyards and pine trees, afford good shelter from high winds. The climate is dry and bracing. The first and last months of the season—May and October—are cool, but seldom cold; in summer the mid-day temperature is hot, but the nights are always cool. The waters contain chiefly chlorides of magnesium and sodium, free carbonic acid, and various bicarbonates. Their temperature ranges from 79° to 100° F. Their physiological effects, which clearly explain the results of the cure, are mainly due to their large amount of magnesium chloride, this salt having a specific action—tonic and stimulating—on the non-striped muscular fibres of the intestinal tract. It is essential to remember that this tonic and stimulating action is by no means purgative or even laxative. It seems to result from recent investigation that radio-activity plays a certain part in the action of Châtel-Guyon water.

The diseases which are successfully treated at Châtel-Guyon are:—Atonic or chronic constipation, muco-membranous colitis, chronic appendicitis, and all morbid conditions of the alimentary canal due to congestion. Great benefit is also derived from the decongestive action of the waters in cases of chronic metritis, dysmenorrhœa, and amenorrhœa, which are so often associated with constipation. The average duration of the cure is three weeks. It consists of an external and internal treatment. The chief feature of the external treatment is the running water bath ("bain à eau coulante"), each bath representing an average of 300 gallons of running water, *i.e.*, a very large amount of carbonic acid and mineral salts; massage and "submarine" douches are useful complements to the baths. Internally the water is administered per os, 1 to 1½ pints per day, in small doses; or per rectum, from 1 to 3 pints, at a pressure which should not exceed 10 inches.

VICHY.

By C. E. CORMACK, M.D.

Vichy, situated in the department of the Allier, on the right bank of the Allier river, is at an altitude of 800 feet, and is about 240 miles from Paris.

The town itself is small, somewhat in a hollow, and surrounded by hills. There are many woods round about, one of the most important being the Bois de Randan. The population averages about 12,500, but over 90,000 persons come to the springs between the months of May and September. Only within the last few years has the drainage system been put upon a solid and satisfactory basis. There is now a regular system of main sewer drainage, and only in some parts of the old town are cesspools still to be seen.

The season opens officially on May 15, and closes at the end of September. Practically it opens on May 1. The average cure lasts about twenty-one days. The climate is very similar to that of Paris. The months of May, June, and September are perhaps those best suited for a cure, as in July and August the heat is often very severe, and has a depressing influence upon the patients. During those months the night temperature is considerably lower than that of the day.

Vichy offers plenty of recreation, both for the invalid and the healthy. It is one of the gayest spas in Europe. The Casino is second to none, and besides its reading room, correspondence room, ballroom, billiard rooms, etc., it has a beautiful theatre, where there are performances every evening—opera three times a week, and comedy on the other evenings. Concerts take place under the verandah of the Casino every evening when there is no opera, and in the parks in the morning and afternoon. The card room at the Casino is very animated in the evening; baccara, écarté, etc., are played, sometimes for large stakes. All over the town gambling in a minor form is indulged in, over the "Petits Chevaux" or "La Boule." The lawn-tennis courts are in excellent condition. The golf links open this year; they are on the other bank of the Allier, and are reached in a few minutes by means of a ferry. Possibly croquet will also be inaugurated this year. There is plenty of coarse fishing in the river, and a little trout fishing in some other streams. The roads are excellent, both for bicycle and motor-car. There are many interesting excursions in the environs, both for public and private conveyances. The walks are limited. While the treatment at Vichy is suitable for all ages and both sexes, it is perhaps rather a dangerous place for young men keen on gambling.

The diseases more especially benefited by these alkaline waters are those affecting the liver, gout with all its tributary diseases, diabetes, gastritis, and biliary lithiasis. Cases of gravel cystitis, and rheumatism are usually much benefited. It is quite a mistake to think that the Vichy treatment is lowering. Numerous cases of anæmia, amenorrhœa, etc., are sent here annually with the best results.

The mineral springs at Vichy are very numerous, the most important being the Grande Grille, l'Hôpital, Célestins, and Mesdames, all of which are used internally. The bath establishment takes its water principally from the Puits Chomal. Besides the ordinary baths, douches, etc., there are numerous other therapeutic appliances at the bathing establishment: "Douches d'Aix," "Piscine," "Bain de Vapeur," "Bain d'Air Chaud," and every variety of electrical treatment, including electric baths, bain de lumière, etc., throat inhalations, nasal douches, rectal douches, stomach washings, and also a very complete Zander institute.

No phthisical patients should be sent to Vichy; those with serious cardiac trouble should avoid the station. In a general way, no patient should come when his disease is in an acute stage.

VITTEL.

By H. J. JOHNSTON-LAVIS, M.D.

VITTEL (alt. 1,100 ft.) is situated in the foot-hills of the Vosges mountains. It occupies a broad shallow open valley, and is surrounded at a distance by rolling wooded hills. The soil is very porous. The hotels, villas, "Etablissement," and shops are half a mile from the town, an advantage shared by few other continental spas. The water of the "Grande Source" is used as a table and bed-room water. The drainage is modern. The season extends from May 25th to September 25th, but visitors are advised to begin their cure not earlier than June 1st, and to finish not later than September 10th, as outside those dates the weather is often bad. That which makes the climate inclement out of the season renders it bracing and bright for June, July, and August, and as the treatment is not depressing an after-cure is not necessary. During the summer the atmosphere is clear and the sun beats strongly during the middle of the day, but there is always a cool breeze. The nights are fresh, and usually a blanket is required on the bed. Those, who like quietness can ramble in the park, or through the adjoining woods, while those, who prefer other recreations and amusements will find plenty of the first order. There is a fine Casino, with baccarat, club, and reading rooms, café, etc. Vittel has, for a spa, the best theatrical season in France. Opera or comedy is given every night in a well-arranged theatre. An orchestra plays twice daily under the great promenade gallery, one of the finest buildings of its kind. During July about £2,000 is raced for, on the magnificent race-course adjoining the park. Motor gymkhanas, assaults-at-arms, horse, dog, flower shows, tennis, and other competitions, kermesses, etc., are held almost daily. There are woodland and open walks, and drives in all directions over splendid roads. English croquet lawns and bowling greens and three or four tennis courts exist in the park. A very sporting, breezy golf course, laid out by James Braid, is six minutes from the springs with a fine pavilion and tea-house. Vittel is gay or quiet as visitors arrange their time. It is chiefly resorted to by people of middle or old age for the relief of their ailments, and by young people for its splendid climate and abundant amusements. Many parents bring their children during the summer vacation. The main medical indications for Vittel "Grande Source" may be summed up as: toxæmias of all kinds, gout, gravel, lithæmia and cystitis, arterio-sclerosis, gouty glycosuria, bronchitis and asthma, eczema, urticaria, neurasthenia, albuminuria, and early cases of epilepsy (absence of NaCl in waters). Biliary colic and gastro-intestinal troubles are successfully treated by the "Source Salée." Professor Huchard sends to Vittel cases of arterio-sclerosis with resultant cardiopathies. The Vittel springs resemble those of Contrexéville and Martigny, but are richer in the active elements, and contain less irritant calcium sulphate. The waters are chiefly used for drinking, but the new baths are most luxurious and possess every up-to-date appliance and apparatus for immersion, douching, bowel washing, vapour simple and medicated, hot air, wet and dry massage, electric, light or other baths. An installation for mechanotherapy and Swedish exercises has been recently established. There are fourteen hotels of different grades, so that millionaires and those possessed of modest incomes are catered for according to their means and requirements.

PLOMBIÈRES.

By E. BOTTENTUIT, M.D.

PLOMBIÈRES, Vosges (alt. 1,500 feet), is situated in a deep valley, the slopes of which are covered with pine forests. The soil is granitic and non-porous. The water used for domestic purposes is bacteriologically pure. The climate is sedative, but the night air, as in other mountainous regions, is refreshing.

The temperature during the day usually ranges between 68° and 78° F., and at night between 53° and 59° F. The season is from May to September, July and August being the hottest months; but, even then, very high temperatures are seldom recorded. In the surrounding country, the scenery is both picturesque and varied, a happy blend of mountain and woodland, with lakes and waterfalls to brighten the landscape. Tramways and motor-cars take visitors to some of the most beautiful spots. Golf has not yet invaded Plombières, but there are lawn-tennis courts, and in the park there is a lake where disciples of Izaak Walton may ply their gentle craft. The town is quiet, but not without animation. There are musical and theatrical performances, and, of course, "Petits Chevaux." The mineral waters are very hot, from 113° to 165° F. L'Eau des Dames is chiefly employed for definite therapeutic purposes, and La Source Alliot as a table water. They are almost without taste and contain only ·39 of solids per mille. They are faintly alkaline and contain arsenic and silicate of aluminium. In what proportion their remarkable therapeutic effects are due to these substances, to their thermality, or to their radio activity (the highest in France, according to Curie), is a problem for future determination. The Plombières waters are used for drinking and bathing, and the local speciality, the combined douche and bath, has received the hall-mark of approval by its adoption, under the name of the Plombières douche, at Harrogate, and at other progressive spas in many parts of the world. Baths with vapour derived from the natural thermal waters, and massage, form important elements in our treatment, but, as the multiform balneological resources of Plombières are now so universally known, it seems unnecessary further to insist on them here.

In general terms, Plombières treatment may be said to be sedative to the nervous and cardio-vascular systems. In France, for many years, and more recently in England, physicians have sent especially cases of nervous dyspepsia and hyper-secretion of the stomach, functional disorders of the bowel, chronic diarrhœa, and, still more frequently, obstinate cases of muco-membranous colitis. Cases of chronic pelvic exudation, chronic gout, rheumatism, neuralgia, and neurasthenia, we must expect to divide with other spas, but wherever a predominantly sedative effect is desired the claims of Plombières should be considered as pre-eminent.

The waters are contra-indicated in phthisis.

AIX-LES-BAINS.

By STANLEY RENDALL, M.D.

AIX-LES-BAINS, in Savoy, a town of about 8,000 residents and some 35,000 annual visitors, is situated in a valley 823 feet above sea level, surrounded by mountains, and in the immediate neighbourhood of Lac Bourget. It is built chiefly on the eastern side of the valley, sloping gently down to the lake. The soil is calcareous and very permeable, with a subsoil of gravel and sand.

The Bathhouse is open all the year, but the season is from May to September inclusive. The climate during this time varies with the month. In May it is changeable, but the warm weather essential for a successful "cure" can usually be counted on from the middle of May to the middle of September.

MEAN TEMPERATURE (FAHRENHEIT).

——	6 a.m.	Noon.	6 p.m.	Midnight.
May - - -	54°	64°	64°	57°
June - - -	61°	71°	71°	65°
July - - -	62°	74°	75°	67°
August - -	62°	71°	73°	65°
September - -	57°	63°	62°	58°

For English people the preferable time for a "cure" is from the middle of May to the first week of July inclusive, or from the last week in August to the end of September. Those, who do not mind the greater heat, and who prefer the gaiety of the height of the season, should come during July and August.

From the medical point of view the chief interest of Aix centres round its sulphur springs and its therapeutical speciality, the "douche-massage sous l'eau" treatment. With an output of 1,000,000 gallons daily, and with their peculiar physical property, due to their richness in barégine or glairine—an organic substance which gives them their characteristic softness—the Aix waters lend themselves to this "under-water massage" as do but few mineral springs. The treatment at Aix has had the reputation of being extremely severe and debilitating, but its weakening or strengthening effect depends entirely upon how it is prescribed by the physician and carried out by the patient.

Another speciality of the Aix "cure" is the "maillot," which consists in the patient's being wrapped up, or packed, after the douche, and then carried in a "chaise à porteurs" from the bath-house to his bedroom. In connection with the douche chambers are "bouillons" or vapour baths, while, in addition to the general or "Grande Douche," there are local douche-massage baths, local vapour baths or "Berthollets," swimming baths, simple reclining baths, general spray baths, or "douche en cercle," and local sprays for throat and eye treatment.

The mineral waters, known as the sulphur springs and the alum springs, contain sulphuretted hydrogen CO_2, and free nitrogen gas, hyposulphites, carbonates of calcium, and chlorides. Their temperature varies from 114° to 117° F. In spite of their sulphur constituents, they are not unpleasant to drink; and, on account of their low specific gravity, they have a marked diuretic action, and are ordered in varying quantities as an adjunct to the external treatment.

For internal use there are other springs:—the St. Simon, Massonat and, notably, the Pugny water, "Source des Deux Reines," which is of a very low specific gravity (total amount of solids 9 grains per gallon). This is a highly oxygenated and slightly alkaline water. Temperature at source 46° F. It is rapidly absorbed into the circulation from the stomach, and as rapidly eliminated by the kidneys, thus acting as a powerful diuretic. The special indications for the Aix treatment are all the complaints included in the subdivisions of the "arthritic" diathesis, more especially the tropho-neuroses and the dystrophies of the various articulations, generally known as rheumatoid arthritis, chronic rheumatism, osteoarthritis, and rheumatic gout. The late Sir Alfred Garrod wrote, that "in rheumatoid arthritis the value of the Aix-les-Bains course far exceeds that of any other known spa." The indications also include rheumatism, lumbago, sciatica, fibrositis, atonic gout, synovitis, peri-arthritis; all articular tendinous and muscular troubles of traumatic origin; neuritis and neurasthenia, and skin diseases, especially dry eczema and lichen planus.

The importance of an "after" or "rest cure" between the termination of the treatment and the return to home life, whether business or merely social, cannot be too strongly insisted upon, and should be of at least from one to three weeks, preferably the latter.

If a record were kept of the Continental spas, showing the number of British medical practitioners who visited each for the treatment of their own ailments, Aix-les-Bains would stand high on the list—perhaps at the top.

A NOTE ON EVIAN.

BY J. COTTET, M.D.

EVIAN is built on the southern shore of the Lake of Geneva, amid unusually picturesque surroundings. The season is from May to October, but a month at either extreme may be added safely. On account of its northerly orientation the air is fresh, but, according to French climatologists, it is sedative. Though there are many splendid walks in the neighbouring mountains, restful steamboat excursions on the broad and dust-free expanse of the lake furnish its distinctive resource for the invalid.

The treatment is essentially that of diuresis.

The source Cachat, known all over the world also as a table water, contains ·5 parts per mille of the carbonates of lime, soda, and magnesia.

The quantity ingested rarely exceeds two litres per diem; but it is found that excretion is raised to a higher point.

As might be conjectured, the great general indications for treatment are auto- or hetero-intoxications, using these terms in their widest sense; while the local indications are those in which flushing of the urinary tract is desired.

The climatic indications will be evident from a consideration of the topographical features.

A NOTE ON CONTREXÉVILLE WATERS.

Abstracted from a Paper

BY DEBOUT D'ESTRÉES, M.D.

PHYSIOLOGICAL and clinical experience combine to establish the fact that the water of Contrexéville possesses two properties: one expulsive, the result of its action on the smooth fibres as well in the intestinal canal as in the urinary or biliary tracts; the other, alterative, changing the condition of the blood. These two properties are demonstrated clinically; the first, by the laxative action, which cannot be explained by the 5 grains of sulphate of soda and magnesia which the waters contain per litre; the second (as regards the urinary tract) is proved by the numerous concretions expelled daily at Contrexéville during the cure, and also by the results obtained in nocturnal enuresis in children, and in chronic cystitis in old patients, in whom the water restores vesical contractility. As regards the action on the blood, gouty or diabetic patients who visit Contrexéville find that during the cure and in the 10 to 15 days following it, they expel a certain amount of brick dust, and that this elimination is associated with improvement in gouty joints or the disappearance of sugar. This expulsion of uric acid is certainly not a washing out, as has been wrongly supposed, but an alterative action on the blood.

BIARRITZ.

WHO has not heard of Biarritz with its Pyrenean prospect, its rocky coast and its sandy shores on which break the billows driven in by the health-bearing gales of the Atlantic? Such are the advantages, natural and inalienable, of this happily situated climatic station; but when we come to consider what has been made of great opportunities, it is impossible to avoid some feeling of regret. The beautiful sloping site, (as with our own south-western town of Falmouth), might have been turned to a much happier account. The undulating cliffs, extending along the sea front, would seem to have been intended by nature as an open-air playground, for a resort that has lived and had its being as a climatic station. Yet these cliffs have been so encroached upon by the builder that the space left for pedestrians is now seriously restricted, who will also be disappointed to find that there are not many short and pleasant walks in other directions.

But Biarritz has the qualities of its defects. The close concentration of the streets of shops and little villas, must be convenient to visitors who are not primarily health seekers; while the enclosure of the sea-front provides splendid dwelling and garden sites for all who can afford to avail themselves of them. There are, moreover, two fine buildings called Casinos, affording gambling facilities which attract a new class of visitors, who are not at all disturbed by the fact that the fresh associations they bring, and the rise in the cost of living, are gradually elbowing out old-fashioned quiet folk. For the motorists, too, such excellent high roads are provided that they can afford to be indifferent to the overcrowding of the golf links.

Biarritz claims to have four seasons corresponding in name with those of the year; but from May 20 there is officially a "close time" of six weeks. In winter the weather (though disparaged as being over-boisterous) is on the whole magnificent, and the visitor who stays throughout this season (December to April) will surely be rewarded by much sunshine and breeze. There are apt to be, however, intervals of cold or stormy weather; so that any one who contemplates taking a brief holiday in southern Europe had better perhaps make his plans for visiting some region where these meteorological eccentricities are more uncommon.

Dr. Malpas, whose long experience entitles his opinions to be received with respect, has kindly sent the following brief note to be added to this paper:—

The average Englishman in average health usually does well here. This is an excellent resort for convalescents old and young, and also for delicate children. Neurasthenics often improve markedly, provided that they sleep well. Biarritz is contra-indicated in all cases where a windy climate is prejudicial. French physicians extend the contra-indication to cases of phthisis in every stage; but in this I do not agree with them.

PAU AND ARGELÈS.

BY D. E. ANDERSON, M.D. (PARIS), M.B. (LOND.).
(Formerly Physician to the Hertford Hospital, Paris.)

PAU, the capital of the "Béarnais" country in the "Département des Basses-Pyrénées," is one of the most attractive provincial towns of the south-west of France—attractive by its position on an elevated plateau 680 ft. above the level of the sea and 120 ft. above the broad valley at its foot, dominating to the south and east an extensive and ever-varying view of the Pyrenean range; attractive by the mildness of its sedative climate, the equability of its daily temperature (in December, maxima, 53° F., and minima, 48° F.; in May, 70·7° F. and 63·5° F.), the luminosity and comparative dryness and the high barometric pressure of its atmosphere; attractive by its magnificent hotels, comfortably-furnished apartments (both of which are under the surveillance of a Hygiene Committee), beautiful parks, lovely promenades along its terrace or below in the valley along the river, its meets of the fox-hounds, races, golf and tennis tournaments, and, last but not least, its proximity to those long and narrow valleys at the foot of the Pyrenees, comparable, in their wild and rugged beauty, with none other than an earthly Paradise.

Who has been to Luchon, St. Sauveur, Eaux Bonnes, and Eaux Chaudes, Barèges, or Cauterêts, and does not wish to return again and again? Not far to the west and south-west are fashionable Biarritz, and pine-covered, peaceful Arcachon with its oyster lagoon, and hypersaline sea where thousands of bathers learn to swim in the summer; and due south-east, between Pau and the Pyrenees, is Argelès, that children's garden of Eden: a charming nest, protected from the inclemency of the cold winds by the mountains which rise all around it—a regular British rendezvous to those who wish to rest from the fatigues of Biarritz, or who, after leaving the Riviera winter, do not care to return to England for the summer. Here the sodium sulphide waters, brought in pipes from Gazost, 10 miles away, after having been re-heated, are used at the Thermal Establishment, splendidly installed with all the modern appliances for baths, douches, gargles, and pulverisations. It is especially the nasopharynx, that wide door of tuberculosis, that is treated at Argelès. It is Pau and Cauterêts and Luchon climatically and therapeutically combined.

But to return to Pau: it is essentially a climatic station, known and well-frequented by English patients for over 100 years past, where the following conditions are treated—(*a*) All cases of excitement, nervous or otherwise; (*b*) Erithic forms of tuberculosis, with violent congestive reactions, fever and hæmoptysis, with threatening complications of pleuro-pneumonia; (*c*) Chronic bronchitis, catarrhs and emphysema; (*d*) Nervous cardiopathy and angina pectoris; (*e*) Painful and irritable dyspepsia.

The climate of Pau is contra-indicated in all cases of—(*a*) Torpid tuberculosis, and where reaction and metabolism are slow; (*b*) Asystole and advanced myocarditis; (*c*) Hyposthenic dyspepsia and intestinal atony; (*d*) Gout and rheumatism (where nutrition is slow); (*e*) Hypochondria or depressed neurosis; (*f*) Insufficiency of reaction (whether in children, old people, or convalescents).

Patients need not wait till the winter sets in before going to Pau, nor return before May, for the autumn and spring seasons are most enjoyable there.

ARCACHON.

ARCACHON (population 8,000) is built on the shores of a large basin or lagoon, which communicates with the open sea by a relatively narrow outlet. The sand banks bounding this lagoon form a primary barrier against the force of the wind, with the result that sea bathing can be enjoyed in smooth water. The long, narrow strip of the town on the sea front, consisting of shops, hotels, and villas, comes down to the water's edge, and at high tide the visitor can lunch in his hotel with the spray splashing the windows. After a sea bath he can finish dressing in his own bedroom. This portion of the town is thronged in summer with visitors from Southern

France, who find it sufficiently bracing; but no Anglo-Saxon would agree with this characterisation, unless he were disacclimatised from northern latitudes by prolonged residence in the tropics. Behind, the so-called "winter town" rises by a rather steep ascent into an extensive pine forest. This section consists of sanatoria, hotels, and ornate villas, inhabited chiefly by Bordeaux merchants and cosmopolitan magnates. As the pines grow somewhat closely, good shelter from both wind and rain is afforded, so that the daily range of temperature is remarkably small, and the thermometric reading is said to be often higher at midnight than from one to two hours earlier. These conditions render Arcachon typically suitable for persons who are unable to tolerate rapid or considerable changes in temperature, or to profit by a more bracing air and brighter surroundings; that is to say, the infirm, but not the indolent. On the other hand the moderately vigorous complain that it is enervating physically and depressing mentally.

As a winter station it is the antithesis of Biarritz. Though the mean temperatures of the three winter months are nearly the same as at Pau, the warmer nights and the greater relative humidity of Arcachon differentiate these two places sharply, from the standpoint of clinical climatology.

Arcachon has been compared with Bournemouth, but the pine forests are the only features in common.

Arcachon is smaller, warmer, more sedate, and more expensive.

BELGIUM. *SPA.*

BY R. WYBAUW, M.D.

SPA (alt. 800 feet) lies in an open valley and is well sheltered by the neighbouring mountains. Its situation may be considered that of election for sufferers from anæmia and circulatory disorders who, as is well known, do badly at high altitudes. There are many short and pleasant walks, and an electric tramway, to be opened in July this year, will allow the visitor to reach without effort the splendid plateaux stretching towards the north. The climate is that of mountains of moderate elevation, and the "fresh air of Spa" is proverbial in Belgium. The rainfall, 34 inches per annum, occurs rather by heavy showers than as a continuous downfall. The mean temperature of the season (May to September) is 56° F., with which may be compared that of Harrogate, 55°, and Schwalbach, 57°.

In the matter of recreation Spa is progressive, for, in addition to the usual continental amusements, it has specialities of its own, such as horse shows and drag hunts, while this summer an 18-hole golf course will be opened.

It seems unnecessary to urge that a town, which has supplied to the English language a new generic term, has every up-to-date appliance for balneotherapy. Bicarbonate of iron is the chief constituent of the springs, while the source Marie Henriette, used for bathing, contains the large volume of 1,130 c.c. per litre. It is often found unnecessary to give more than 1 litre per diem of iron water, which is equivalent to a dose of 2 grains of bicarbonate of iron. Probably no such minimal dose of a pharmaceutical preparation would raise the percentage of hæmoglobin and of erythrocytes with equal efficiency. Observations have shown that Spa water increases nitrogenous metabolism and, perhaps in consequence of this, the maximum benefit of the treatment is not reached until some months after the termination of the "cure."

Spa has long claimed as within its special domain every morbid condition in which the use of iron and of mud baths is of service; but in the last few years it has also been found that its gaseous baths have a selective action in cases of failure of cardiac nutrition. At Spa, invigorating air, sparkling tonic waters, generous fare, and the few restrictions imposed, accord so well with the sunny brightness and gaiety of the place, that our visitors, at the end of their "Kur," look back upon the time they have spent here as a pleasant holiday.

GERMANY.

SIMPLE THERMAL WATERS.

SIMPLE or "indifferent" thermal waters are distinguished by their feeble mineralisation, their small gaseous content, and by the fact that their natural temperature exceeds 68° F. As the springs are frequently found in romantic wooded or mountainous regions the descriptive term "Wildbäder" has been applied to them. It has not been proved that salts in solution pass through the skin, and it can scarcely be stimulated by the minimal quantity contained in these waters. We are on safer ground, therefore, in considering their external action from the thermal standpoint only.

Baths given between 93° and 95° F. are said to be at the temperature of thermal indifference. They give rise to no changes in the distribution of the blood-stream, or in the heat-regulating mechanism; but, subjectively, they have a sedative effect on the nervous system. If the temperature of the bath is slightly lowered a chill is felt, the vessels of the skin contract, and an increased volume of blood passes through the deeper part of the body, with a consequent increase in nutritional activity in that situation; at the same time the heart beats with less frequency but with greater force. Shortly after each bath there is an equal and opposite reaction. If, on the other hand, the temperature is slightly raised, the normal loss of body-heat is checked, the vessels of the skin dilate, and congestion of the deeper parts is relieved by a diversion of the blood-stream towards the periphery. The heart beats considerably faster, and for a time with greater force, but, owing to the vascular dilatation, blood-pressure is only a little raised. Since the peripheral parts of the body are better supplied with blood, nutrition takes place there with increased activity, and the absorption of morbid products is favoured. If the temperature of the bath is further raised, respiration quickens, the heart beats with much greater force and frequency, vascular dilatation becomes general, and blood-pressure rises, with a consequent stimulation of general metabolism. If such a bath is continued too long, the heart loses its power, and general exhaustion ensues. If, instead, the patient is removed, and suitably covered with blankets, cooling is gradual, and the influence of the original thermal stimulus is greatly prolonged. The action of the thermal factor is believed by many balneologists to be practically unchanged when more highly mineralised waters are employed. Such are the thermal principles more commonly accepted by balneologists. In their adaptation to individual needs, physicians at the Wildbäder display considerable skill. No one doubts that, by these procedures, general and local metabolism is increased, but whether these circulatory gymnastics have any directly beneficial action on the heart must be regarded as still a matter of controversy.

Hitherto metropolitan physicians have attached little importance to the saline constituents of these "indifferent" waters, whether used internally or externally. Some local writers, on the other hand, consider them to have remarkable virtues, as shown by their lists of "indications," which mention morbid states, for the inclusion of which they offer no justification. Recent discoveries do, however, suggest great possibilities for these springs, and as chemists and physicists have done more than their share in this matter, it is to be hoped that the rational elucidation of their action will further engage the attention of those who daily prescribe their employment.

It is more agreeable, as in the following sketches, to write of the Wildbäder chiefly as stations for rest and change; for then unstinted praise can be given.

It should be clearly understood that there are few "amusements" in these quiet spots. To enjoy them thoroughly it is necessary to possess considerable mental or physical resources, or else to be desirous of complete rest. If a happy choice has been made, the sojourner may say, *Ille terrarum angulus praeter omnia mihi ridet.*

SCHLANGENBAD.

This picturesque village, of some 500 inhabitants, is truly idyllic in situation. It nestles in a deep valley, overlooked by densely wooded hills, some of which rise to a height of

1,900 feet. From their shelter it derives a mild climate, with an atmosphere well ventilated by the opening of the valley towards the Rhine some miles to the south, and by its bifurcation at the northern end. With this configuration, so advantageous in summer, it is necessary to issue a word of warning that the valley is apt to be very stormy in spring. For lovers of mountain and woodland scenery there is a varied choice of pleasant and easy walks, or of longer excursions among the Taunus hills. Everything in this delightful spot seems conducive to rest, and, without ignoring that other indications are officially mentioned, it is sufficient for practical purposes to regard it broadly as a place highly beneficial for "nerves in disorder"; and, as Nature has thus afflicted more women than men, it is essentially a ladies' spa. It is impossible to state exactly what it is that makes this pre-eminently the "rest cure" spa of Germany, or perhaps of the world. Some places have a physiognomy which seldom fails to impress the receptive observer, and in this unique spot we seem to think only of rest for rest's sake.

The suggestive name of Schlangenbad is not without justification, for the agreeably soothing sensation, during and after immersion in these soft waters, does not require for its recognition the use of the imagination—scientific or otherwise.

WILDBAD.

Reference to Wildbad is commonly taken to mean, not one of the many "Wildbäder" of which it is the prototype, but the splendidly situated and increasingly popular resort lying in the valley of the Enz, in the Black Forest. The direction of the valley north and south, and the influence of the surrounding pine-clad mountains keep the air fresh and cool, while tempering the occasional excessive force of the winds. The nights are sometimes chilly, even in warm weather. Hunting and fishing are to be had in the neighbourhood, and the town provides some amusements for its visitors. In connection with Wildbad we hear of many affections, some of them incurable, which are said to come within its special province. Consideration of these claims may be dispensed with, without disputing that in these ailments all the benefit derivable from judicious medical treatment will doubtless be advanced when carried out in this pure atmosphere. In consonance, however, with the general plan of this number, in which it is intended never to ignore local opinion, the first four indications given in the medical publications may be mentioned. These are: Gout, rheumatoid arthritis, dyspepsia, and all forms of paralysis. Though a quiet or, as some have described it, a dull little place, there is something virile about Wildbad. It is essentially a summer holiday resort for the overworked man of culture, possessed of an active brain and fairly good physical power. Its rôle is rathei to recharge the organism than to reconstitute its damaged elements. Its bathing arrangements are excellent, even for a German spa, and Dr. Weizsaecker rightly lays stress on the fact that the water is conducted straight from the borehole to the baths, which are built immediately over it. This is important, since radio-activity is lost by manipulation or by carriage to a distance,—and the water of Wildbad is highly radio-active.

BADENWEILER.

Badenweiler has the same general indications as other resorts of its type. As a climatic station it has long had a certain vogue, and, during its season, which is in summer, attracts a fair number of visitors. The climate is mild, and Dr. Schwoerer calls attention to its excellence in spring and in autumn. Its situation upon a hill in the midst of higher mountains is picturesque in the extreme. Badenweiler is specially useful as a summer resort for pulmonary invalids, and it is, perhaps, *the* "after-cure" station for those who have been through a course at one of the more strenuous spas, such as Karlsbad.

To supplement this short notice, Dr. Schwoerer has kindly sent the following list of indications :—Diseases of the heart and arteries, functional and organic diseases of the nerves, gout and rheumatism, diseases of the kidney and liver, asthma, emphysema, chronic bronchitis, and tuberculosis in the first stage.

ALKALINE WATERS.

EMS.

By ALBERT VOGLER, M.D.

EMS (altitude 265 feet; population 6,800) lies some 6 miles from the Rhine, in the valley of the Lahn, which here curves S-like through the mountains, dividing the place into two parts. In the distance on one side of the river, rise high and finely wooded hills, while, on the other, lower hills slope down to the town, with stretches of meadow, orchard and vineyard. Sheltered by these, on three sides, from the colder winds, its climate during the season (May to October) is mild and fairly dry. At night, however, there is always a cooling breeze, and a considerable drop in temperature, due to the currents of air coming after sunset from the valleys, sunless during most of the day. Stuffy nights are rare, even when the days are warm. The idea—too prevalent among strangers—that Ems is a very hot and relaxing place, is quite dispelled by the meteorological observations, which show the mean temperatures from 1896 to 1905 to have been as follows:—

Mean: —	May, 55°;	June, 63°;	July, 65°;	Aug., 63°;	Sept., 58°
Mean, max.	„ 66°;	„ 77°;	„ 75°;	„ 74°;	„ 50°
„ min.	„ 45°;	„ 52°;	„ 56°;	„ 54°;	„ 50°

Ems is rather quiet than gay, though it does not lack the usual amusements of a Spa. Good fishing and shooting are obtainable, and, among other games played in the "Kurpark," bowls afford an exercise especially suited to invalids. Motor boats ply on the Lahn; small ones between the local landing places, and a larger one for excursions to the Rhine. At the top of the Malberg, which is reached in seven minutes by a "funicular," the "air cure" is carried out, and visitors will there find level paths leading through the woods for miles in all directions.

The most important feature of the Spa from the remedial point of view consists in the large number of mineral springs, of warm or hot water, to which it primarily owes its reputation. Nine are used for balneological purposes. Eight of these are the only warm alkaline muriatic springs in the whole German Empire. The chief contents of the Ems waters are bicarbonate chloride of sodium and carbonic acid. While the first two ingredients occur in nearly the same quantity in all the springs, there is a notable difference between them in the amount of carbonic acid contained. This varies according to the normal temperature of each spring, which ranges from 82° F. in some to 122° F. in the hottest. One spring, differing from all the rest, is cold and ferruginous.

The waters are used for drinking, for gargles and nose-douches, for inhalations, and for baths. For these purposes six bath-houses, several gargling rooms, and eight inhalatoria are provided. The general action of the waters is to regulate the functions of the mucous membranes. At the beginning of the cure these usually give increased, but thinner, secretion, which afterwards gradually diminishes. The waters further act as an antacid, neutralising acidity in the system, and also the urine; while they are diuretics o considerable potency. The warmer springs generally have a slightly constipating effect, while the colder tend to assist the action of the bowels.

Such being the action of the waters, simple (not specific) catarrhs of any of the mucous membranes are the general indications for a cure at Ems; and the treatment there of one very common class, among others, of these catarrhs—those of the respiratory tract—has acquired special reputation. The treatment of these respiratory catarrhs is described in detail elsewhere in this number. In addition to catarrhs, diseases caused by faulty metabolism are suited for a cure at Ems; for example, certain cases of gout and goutiness, especially in weak and irritable patients with a disposition to indigestion and to intestinal catarrhs. The waters are of benefit in such cases, as their effect in neutralising or diminishing acidity and washing out the system through their diuretic action exerts a favourable influence on the gouty catarrhs. Chronic rheumatism, also, is greatly benefited by warm mineral baths. Phthisis, with rare possible exceptions, is a strict contra-indication.

NEUENAHR.

BY KARL GRUBE, M.D.

NEUENAHR (altitude 354 feet) is a small town situated in a broad valley, along both sides of the River Ahr, twenty minutes by rail from the Rhine, and one hour from Bonn. It lies at the foot of a tree-clad hill, from which there extend miles of wooded country, affording a great variety of walks amid charming surroundings.

The soil is chiefly of gravel, and the drinking water free from contamination. The season lasts from the end of April till the end of September. The climate is equable; somewhat hot in July, and most agreeable in May, the first half of June, the latter half of August, and in September. The air is mild and fairly dry, but cannot be called bracing. For the three summer months the mean temperature is 65° F. There are no violent changes towards evening, and out-of-door life may be enjoyed without risk until late at night. There are daily concerts, mostly in the open air, and a good theatre. Trout-fishing is obtainable in the river. Neuenahr, on the whole, is a rather quiet place, and best suited for invalids of middle and advanced age. There are good hotels and private boarding-houses.

In a recent publication Neuenahr has been described as lacking in shade. However true this may have been some twenty years ago, as to the immediate vicinity of the town, the improvements in this respect, since effected, have removed the reproach.

According to my own experience, the diseases which can be treated with the greatest success at Neuenahr are:—Diabetes, especially the gouty, obese, and nervous forms; irregular gout, asthma, gall-stones, uric acid stones and gravel, hyper-acidity, chronic albuminuria, and catarrh of the various mucous membranes.

There are two important springs, the waters of which are used internally and externally. They have a powerful diuretic, but very slight aperient action. Among the other appliances employed are mineral, carbonic acid, Fango, sand, electric light, vapour, and hot-air baths. The waters are also used for inhalations.

The resident population is healthy, and epidemics have long been practically unknown, while typhoid fever and tuberculosis are rare.

COMMON SALT WATERS.

ABOUT one-third of the mineral springs of Germany belong to the muriated or common salt group. They are found in the oldest as well as in the more recently developed health resorts, so that their empirical and scientific employment is well understood. It seems best, therefore, to go to German sources for a summary of their action and uses. Of the many papers perused for this purpose one by Dr. Thilenius appeared to be the most practical, so that, with some omissions and alterations, the indications given there have been followed.

The first effect of the internal administration of these muriated waters is a stimulation of the intestinal glands, with increased peristalsis; but as the greater part of the saline solution is absorbed high up purgation may not follow. At this stage there is a slight loss of weight, with an increased excretion of urea and uric acid, and usually a sense of general well-being. Owing to improved appetite and assimilation, all the bodily functions are better performed, and a gain in weight soon follows. This energising effect is specially noticeable where there is diminished metabolic activity, as in scrofula.

The principal indications for internal use are :—

(1) Apyrexial phthisis. (2) Chronic gastric catarrh with hyperacidity and excess of mucus. (3) Gastric neurosis with hyperacidity. (4) Chronic constipation or diarrhœa (from local action on the intestinal mucosa). (5) Chronic catarrh of the air passages. (6) Chronic atypical gout (when associated with digestive disturbance). (7) Excessive corpulence. (8) The alcohol or tobacco habit. (9) The scrofulous diathesis.

The chief contra-indications are :—(1) Gastric hyperacidity, (except as above). (2) Acute congestion or inflammation of the mucous membranes. (3) Gastric dilatation with pyloric stenosis. (4) Diarrhœa from ulcerative lesions. (5) Severe forms of anæmia. (6) Nephritis and cystitis.

Muriated solutions used in baths, by penetrating the clefts in the epidermic envelope, stimulate the cutaneous nerves, and it is believed that then by extension, and through reflex paths, the stimulus is conveyed to the general nervous system. During and after the bath, the saline particles, which coat and partially penetrate the epidermis, delay heat loss, and consequently a sense of warmth, first local, and then general, is imparted. For this reason baths of a lower temperature can be employed. If they are given a little below the point of thermal indifference, the primary action of cutaneous vascular contraction is rapidly followed by an opposite reaction. The same phenomenon is observed when there is a considerable volume of free carbon dioxide in the water. That the stimulation of the functions upon which metabolism depends, induced by these warm salt baths, is chiefly due to thermal influences, is the prevailing opinion at the Wildbäder. At Spa, however, where the waters are feebly mineralised, but rich in CO_2 gas, this is stated to exercise a selective influence in cases of failure of cardiac nutrition; while at Kreuznach, where the springs contain little gas but much salt, strong brines are relied on. At Nauheim, where there is notable richness both in salts and gas, this combination is believed to be ideal. Pharmacological analogy may be cited in support of this last contention.

The conditions benefited by the external use of these waters are:—(1) Scrofula; (2) Residual exudations of all kinds; (3) Gout, rheumatism, and rheumatoid arthritis; (4) The curable anæmias; (5) Catarrh of the air passages; (6) Some forms of heart weakness; (7) Neuroses dependent on nutritional defects; and (8), generally speaking, every condition in which the stimulation of metabolism is desirable.

WIESBADEN.

THE richly wooded hills of the Taunus range, at the southern base of which it lies, afford Wiesbaden not only a picturesque background, but a shelter on three sides from northerly and easterly winds. During the spring (the high season) and the autumn, the second, or so-called grape cure, season, the climate may fairly be called ideal. Midsummer is apt to have its periods of heavy and humid heat; not so excessive, however, as to deprive the town even then of a large contingent of visitors. Though rather cold for a health resort, the winter is by no means severe, and is tempered indoors by the general use of "central heating," now so much in vogue on the Continent. As a consequence of its favourable climatic conditions, its numerous therapeutic resources, and the many attractions, both urban and rural, which it offers, whether for residence or temporary resort, Wiesbaden is annually frequented by some 160,000 visitors. It is handsomely built, notably well ordered, and scrupulously clean. Its general atmosphere is bright and cheerful, without either feverish gaiety or a disturbing bustle of business. The residential and pleasure quarters are so well furnished with trees and open spaces that it can justly be called "a garden city." The new Kurhaus—a very costly and somewhat overgrandiose establishment—is open all the year round, and provides excellent and varied entertainments. The hotels are numerous and good. Those which are near the Kurhaus, or are directly supplied with the thermal waters, make these advantages a factor in their charges. The waters are used for bathing and drinking. They vary in temperature from 100° to 160° F., and, as they belong to the isotonic group, their range of applicability is wide. There are several excellent establishments where other forms of treatment are carried out, such as by Swedish gymnastics—manual and mechanical—electricity, massage, etc. In the annexe to the Kochbrunnen are inhalation and gargling rooms, where treatment is given as at Ems. The private clinics for the treatment of diseases of the eye and stomach, and for Leyden-Fränkel re-education of the muscles, are of international reputation.

Wiesbaden is the most fully developed health resort in Germany. It serves as a type to which the others tend to conform, so that the medical man, who wishes to familiarise himself with the scope and aims of German spas, had better begin by visiting this one.

HOMBURG.

THE therapeutic reputation of Homburg, if not eclipsed, has been at least equalled by its renown as a fashionable pleasure resort. Even the latter has been waning to some extent of late years in the eyes of some of its patrons, but that is due to other causes than any change in its natural attractions, or its rather artificial beauty. Homburg is undoubtedly beginning to feel the effect of the rivalry of other Spas, and especially of its progressive neighbour Bad-Nauheim, which in various ways has greater resources for the pleasure seeker. The situation of Homburg is somewhat higher and more open towards the north than other resorts in the same district, and in consequence it is more bracing. The waters are of nearly the same strength as those of Wiesbaden and the indications for their use are similar. If "Society" deserts Homburg, and invalids drift elsewhere, it will probably still hold its own as a family Spa with a leaning towards games, for which it is particularly suitable, owing to the freshness of the air and the excellence of the turf.

KREUZNACH.

BY F. ENGELMANN, M.D.

THE climate of Kreuznach is very mild and dry. The mean annual temperature is 53·6° F., and that of the months of the season, from May to September, 62°. The rainfall is relatively small, amounting only to 10·4 inches for the summer months. At midsummer the heat is apt to be oppressive, so that it is better for English patients to come here either early or late in the season.

The town is old, but the "bath town" is quite separate from it. The drainage system has recently been remodelled. It is necessary to emphasise this point, because quite lately misleading statements have been made on the subject. In the Kurhaus there is a very complete installation of appliances for balneotherapy, but, in addition to this, salt water is conveyed to all the hotels and pensions, so that patients can take baths without leaving the house. This is an advantage shared by few other spas.

The springs are very numerous, and most of them are used for the manufacture of salt and of brine (Mutterlauge). All of them have the same constituents, though the proportions vary as do their temperatures, which are from 59° to 87°. The Elisabeth Quelle and the Oranien Quelle are the principal ones. They are used for drinking, as well as for bathing, and contain about 13 parts per mille of solids, of which chloride of sodium is 10 per mille, and chloride of calcium 2 per mille; other constituents are bromine, iodine, lithium, and arsenic. Lately, a great deal of radio-active material has been found in the water; more in fact than in any other strong salt springs.

More famous than the drinking cure is the world-renowned brine cure. The brine contains from 300 to 400 parts of solids per mille, of which 20 per cent. is chloride of calcium.

The principal indications for treatment are: the scrofulous diathesis; scrofulous affections, such as glandular swellings, chronic inflammations of the bones and joints, chronic catarrh of the conjunctiva, and of the ear and air passages; affections of the heart and blood-vessels, especially arterio-sclerosis; rheumatism. The treatment of chronic pelvic inflammations and of uterine fibroid tumours is a not less important speciality of Kreuznach.

BADEN-BADEN.

In the past the name of Baden inevitably called up associations of gaming and the somewhat feverish international gaiety which led Thackeray and many lesser novelists to choose it as a picturesque scene of adventure for their characters, and which even obscured in some degree its fame as a resort for invalids. The gaming has long been abolished, but the cosmopolitan gaiety has not vanished with it, nor the beauty of situation, which Alfred de Musset described as that of "an English park on a mountain." The charm of its surroundings and the varied attractions and amusements of the handsome town itself continue to make it one of the most popular resorts in Europe, and in Germany probably still second only to Wiesbaden in its number of visitors, among whom the pleasure seekers predominate over the patients. The chief season is from May to October, but there is also a winter one, while Baden is much used for an intermediate stay by persons on the way to or from warmer winter resorts. The common salt waters are not very strong, so that the indications are practically those of the Wildbäder, and, as with some of these latter, the recently ascertained high radio-activity may extend the range of their utility.

KISSINGEN.

By ALBERT ROSENAU, M.D.

Kissingen is situated in a pleasant and fertile valley of the River Saale. It is a nice little town, of about 5,000 inhabitants, with fine and remarkably clean streets and avenues, and many beautiful villas, standing mostly in their own gardens. The surroundings are extremely lovely; pine and oak forests, and many relics of mediæval times, such as old castles and ruins, are in the near neighbourhood. The soil is porous, and the drainage system might serve, according to Professor Pettenkofer, as a model to any large city. The season lasts from May to September. In summer the air, owing to the many surrounding woods, is suitably tempered and sufficiently bracing, and the nights are generally cool.

Kissingen does not offer a whirl of gaiety, which would be wholly incompatible with the sedation that we desire for most of our patients; but amusements are sufficiently provided for, and there is very good fishing. The centre of life is presented by the charming and large Kurgarten, where the drinking course is usually taken.

The special indications for treatment are:—Dyspepsia, chiefly of the type of insufficient formation of HCl, functional liver disorders, and colitis. Most of the diseases of metabolism are benefited by the course. For cardiac cases and those of early arterio-sclerosis, we have natural carbonic-acid baths with a very high percentage of free CO_2. Some London physicians specially commend Kissingen for the treatment of obstinate constipation, while the gynæcologists appreciate our "Kur" for the functional and organic diseases of women amenable to spa treatment.

In comparison with other places presenting similar indications, such as Homburg, Karlsbad, and Marienbad, it may be asserted that at Kissingen the conditions are in many respects superior for the *invalid;* life being much quieter, somewhat cheaper, and the "Kur" not so lowering, though a strict dietetic *régime* is carried out in most of the hotels.

For internal use we employ the following springs (chiefly of the cold chloride of sodium type with a slight amount of iron):—Racoczy, Pandur, and the stronger muriated springs, Maxbrunn, and the iron water of Bocklet. For external use we employ Pandur baths, the different muriated springs with about 2 per cent. of NaCl, and a very large amount of free carbonic acid; mud-baths, baths, and poulticing with Fango. There is a very good inhalatorium, a Zander institution, and a new swimming bath in the River Saale.

Kissingen is growing rapidly, and the number of English visitors is increasing every year. In a short time a new railway line will be built, by which the journey from London will be shortened by three or four hours.

OEYNHAUSEN.

THE chief factor differentiating Oeynhausen (a spa not yet well known in England) from the now overcrowded Nauheim, is the specialisation of the medical men, on the spa and general treatment of diseases of the nervous system. The thermal carbonated waters of the two places are closely akin, those of Oeynhausen being a little richer in sodium chloride, and those of Nauheim in free carbonic acid; while in both of these resorts they are used for the most part externally. The village is situated on the Werre, about 1½ hours' journey from Hanover and 13 from London. It is remarkable for the unusually large area of its well-shaded, park-like grounds, and for the number of its detached villas, each of them surrounded by a pleasant garden. The feature that first strikes the visitor is the omnipresence of the wheeled chair. These are to be seen in greater numbers than in any other part of the world, and they are a sufficient stamp of the speciality of the spa. Patients sit in them at church and at theatrical and musical performances, as well as in the public pleasure grounds.

Any case coming within the domain of carbonated salt waters may be sent to Oeynhausen. It is, however, specially to be selected for diseases of the nervous system, owing to the wide experience of the local physicians in their management. In these cases, as in all others, the skill of the medical man is of greater importance than the composition of the mineral waters. Those, whose experience of grave organic diseases of the nervous system has been limited to observing their phenomena in hospital, can have little idea of the wonderful improvement, both subjective and even objective, derived from treatment directed to stimulation of the general nutrition. One of the ways of promoting this improvement is to send the patient to Oeynhausen for the summer months.

In writing this sketch, free use has been made of a paper kindly sent by Dr. Voigt, which was, unfortunately, much too long for insertion.

NAUHEIM.

BAD NAUHEIM is the most progressive—it might almost be said aggressive—of modern Spas. Description of it is needless. For the surroundings, read of the Taunus district, for the town, make a composite picture of half a dozen other German Spas, and for its resources, take all that are found in kindred health resorts, and Nauheim has them—or it very soon will.

All Spadom seems intent on adding fuel to the flare of its reputation. Heart-weakness is added to the "indications" when carbon dioxide is found in the springs. If not present, it is fabricated, and "Nauheim baths" find their way into the prospectus, where they serve as an excellent advertisement—for Nauheim. All the energy that is expended on pushing Nauheim has led to the only possible result—that everyone with a twinge in the left side of the chest begins to think of the heart Mecca. So much for the lighter side. The real problem pressing for solution is the value of balneo- and kinesitherapy in the treatment of cardiac affections. A paper bearing on this subject is printed below; while another view is expressed in the paper beginning on page 34.

A NOTE ON NAUHEIM BATHS.

BY PROFESSOR J. M. GROEDEL, M.D.

IT is now fifty years since Professor Beneke published his first article upon the effects of Nauheim waters in heart disease. My own experience has included several years of work as his assistant, and more than thirty of practice at Nauheim, as well as scientific experiments. To relieve the heart, we lessen the peripheral arterial resistance; to stimulate it, we promote peripheral contraction. It is the thermal factor to which the effect of Nauheim baths upon the heart is in the first place due. Whether this effect is in part dependent upon the natural origin of the heat, and would be modified by its artificial production, we do not know. The remarkable results obtained from natural thermal waters of low mineralisation led to this belief; but these results are now ascribed to radio-activity; a quality which these waters have in common with our own. The stimulating action of carbonated waters has been plausibly accounted for by the supposition that, owing to the difference in specific heat and conductivity of water and CO_2, the thermal stimuli originating from them are in some way different also. To the action as a whole we give the name "Kontrast-Wirkung," *i.e.*, an effect of thermal contrast. This effect is the more marked, the lower the temperature of the water, and the higher the percentage of CO_2. For stimulating the heart, therefore, we employ the cooler and more highly carbonated baths, while for sedation we use relatively higher temperatures with less of the gas.

We do not claim that only from Nauheim waters can these results be obtained; nor do we profess to have reached finality in technique. But this we do know; that wherever water akin to ours is found, it is used for the same purpose as that for which we use it; while our methods are followed, and are called "Nauheim" methods. Our treatment does not supersede any other. When necessary we use other agents in combination with or instead of those which are peculiar to Nauheim. We have, indeed, brought new resources to the *armamentarium* of the physician, but we have not added to the number of medicine's specifics. While testifying to our results, we cannot affirm that the explanations we offer are more convincing or final, than those advanced in other parts of the field of clinical medicine. That these baths stimulate metabolism is admitted. From this the myocardium cannot but derive advantage. Can drugs do as much? We believe that we can at will relieve the heart, or stimulate its activity. Can drugs do more?

EARTHY WATERS.

WILDUNGEN.

WILDUNGEN is situated in an open valley at about 1,000 feet above sea level. Though partially sheltered, it is breezy, or, according to the official description—bracing. The imputation of rawness is repudiated, though it is considered appropriate for one of its French rivals, Contrexéville—also situated in a mountainous district. The waters have been used and valued for centuries, but it is only recently that the organisation of the spa has been placed on a thoroughly satisfactory basis. In all the hotels and boarding-houses, diet "regulated in conformity with the cure" is provided. In addition to the usual resources for recreation at a small spa, there is a very accessible golf course; a wise provision in a resort which is visited principally by patients of the male sex, and which is ambitious of increasing its now relatively small English *clientèle*.

The speciality of Wildungen is the treatment of calculous and inflammatory affections of the urinary tract, in dealing with which it is the only serious German rival to an important group of French spas. Partly for this reason, and also on account of certain differences in composition between the Wildungen waters and those of the French spas, its progress has recently been rapid. Special stress is laid on the presence of the "active" bicarbonate of calcium, and on the absence of the "inert" or the "irritant" sulphate.

Two springs only need be mentioned here, the Georg-Viktor Quelle and the Helenen Quelle. Both are used in chronic nephritis and in the other affections treated at Wildungen. They are sometimes given in succession. According to Dr. Marc, who has kindly supplied the writer with much technical and general information, the Georg-Viktor Quelle is definitely indicated in phosphaturia, whether existing as a consequence of disturbance of metabolism, or in association with local concretions; and also in atony of the bladder. He employs the Helenen Quelle, a much more highly mineralised water, in uratic gravel and stone, in oxaluria, and various gouty conditions. The waters are bottled for export, and for this purpose the Helenen Quelle is now most in demand: a fact of some interest, as the reputation of the spa was originally established by the other spring named. The duration of the Kur is four weeks or more, and the quantity of water drunk daily (chiefly in the morning) varies from about a quarter of a litre to a litre and a half. It is asserted that these waters lessen the formation of uric acid and promote its excretion; that they lead to the expulsion of small concretions; and that when such expulsion does not take place, their beneficial action on the whole tract places the patient in a much better condition for operation. Many operations are performed every year, so that Wildungen has been appropriately named "the surgical spa."

IRON WATERS.

CAREFULLY compiled tables were recently published, showing the gain in hæmoglobin and red cells following the administration of pharmaceutical preparations of iron. It was hoped that it would have been possible to collect for this number records showing, by comparison, the value of natural iron water in the treatment of the curable anæmias. Enquiries, however, made at home and abroad have yielded practically negative results. The reply from Schwalbach was that, though blood examinations were made occasionally, no records suitable for publication had been kept. This is remarkable, for anæmia is perhaps the one condition dealt with traditionally at spas, the progress of which is amenable to exact methods of determination. The only records in tabular form that have been received, were furnished by Dr. Wybauw of Spa. He proceeded in a scientific spirit, by treating, with iron water only, eight residents in the town. In six of these cases the result was indecisive, or the record incomplete, while in the remaining two the issue would have been considered satisfactory, if a pharmaceutical preparation of the metal had been employed. In looking at such a record, we recognise the honesty with which it was made, and we must admire the courage which led to its publication. It is usually stated, that effervescing bicarbonate of iron waters are specially indicated when there is a difficulty in assimilating the ordinary inorganic salts. It is doubtful whether there is any foundation for this claim, as a short course of careful diet, with perhaps some simple prescription, will prepare any one, capable of taking iron at all, for the ingestion of the milder metallic preparations, especially if they are given in aërated water. A well-known German balneologist writes: "Practice teaches us that natural iron waters are better adapted for therapeutic purposes than are iron preparations." This author adduces no evidence in support of his contention, but until it is forthcoming and made easily accessible, physicians, who practise at chalybeate spas, must not be surprised at the continuance of scepticism as to the importance of treatment by these iron springs.

SCHWALBACH (Officially LANGENSCHWALBACH).

A MUCH frequented spa of some 3,000 inhabitants, lying on the south-western slope of the Taunus range within an hour's journey by rail from Wiesbaden. There is a nicely laid out public park, with a modern croquet lawn, and a special playground for children. Ladies may perhaps be glad to know, that, as an inducement for their male relations to accompany them, there is very fair roe deer shooting and trout fishing, and that the very accessible golf course, opened in 1907, has this year been made much more sporting. In the hotels it is curious to observe at meal times the long rows of patients with pallid faces. The mean summer temperature is 61° F., but English visitors sometimes find the mid-day heat oppressive. In the present state of opinion English patients, who suffer from poverty of blood, expect that Schwalbach will be chosen for them as a health resort. Pyrmont is visited chiefly by Germans, and there is a temporary eclipse in the popularity of Spa; and as it seems to be believed that each watering place should have only one ailment assigned to its special domain, the much stronger bicarbonate of iron spring at Marienbad (Ambrosiusbrunnen), scarcely comes into the count. Schwalbach at any rate is suitable for patients who desire a quiet life in a very pleasant place, and who are not depressed by a warm temperature. St. Moritz, which has also effervescing bicarbonate of iron waters, with however a lower iron index, is very much "brighter," but its high altitude has to be remembered when there is concomitant heart weakness. Dr. Franz considers that, owing to its proportionate richness in free carbon dioxide and poverty in lime salts, the Stahlbrunnen water is specially easy to digest, and that it does not cause constipation. In these respects he compares it favourably with the waters of Pyrmont. He also states that the Schwalbach spring contains more free CO_2 than those of Nauheim. If that be so, and this characteristic be accepted as the touchstone for cardio-therapy, the "Heart Spa" may yet have to look to its laurels. At Schwalbach, as at other iron Spas, intelligent care is bestowed upon diet and regimen. Value is attached to the use of carbonic-acid baths, and ordinary preparations of iron and arsenic are given.

THE AUSTRIAN EMPIRE.

MARIENBAD.

THE country about Marienbad consists of wide stretches of undulating meadow and moorland, varied by wooded hills of moderate acclivity. Hence it is well adapted for the pedestrian exercise which is always prescribed as part ot the treatment, but not as much practised as it should be.

The town itself lies in a valley with rather steep sides which shelter it in every direction, except towards the south. In the centre is the "Park," which, though admirably laid out, is on a small scale. This disposition, however, is decidedly advantageous, as the valley itself is so narrow here that the allotment of more space to the garden would have encroached unduly upon the area for building purposes between it and any convenient height on the lateral slopes. Because of this limitation of space, and perhaps also because Marienbad is one of the newest of the important Continental watering-places, most of the houses are unusually lofty; a characteristic which might tempt a writer who was infected by the virus of Spa literature to dub Marienbad the sky-scraper Spa. Its enforced concentration imparts to this striking place—little more than a village in size—something of the self-conscious importance of a minor metropolis. The contrast afforded between the foreground of imposing modern buildings, retaining in this clear atmosphere an almost aggressive whiteness, and the sombre background of closely set fir trees, is most striking, and, on a bright moonlight night, has a suggestion of theatrical effect.

At the height of the season, the general aspect of Marienbad has some of the characteristics of a fashionable German Spa on the one hand, and a typical "Wildbad," or an alpine village, on the other. Thoroughly German are the thoughtful and orderly regulations of its organisation as a Spa; while the alpine atmosphere asserts itself the moment one steps beyond the town limits and ascends the slopes into the pine woods. The centre of the Spa life is the Kreuzbrunnen promenade. Here the promenaders assemble, twice a day, when the scene is one of animation, and, in the morning, of expectation as well, if Royalty is in residence. For few are the men, and still fewer the women, who do not find delight in gazing at a Monarch—and, be it said—in gazing at rather close quarters, despite the gentle admonitions of the uniformed officials, and the manœuvres of certain lynx-eyed satellites, whose *bourgeois* attire deceives no one as to their actual functions. Armed camp though Europe may be, the Peacemaker still bears off the palm of popularity.

Marienbad is not by way of being a "strenuous" Spa. "Society" is very adequately represented, and even the invalids would seem to look on the brighter side of life. Among the promenaders (though the type does not actually predominate) are to be seen portly men and women—even children, who must surely have laughed in growing so fat; while even the severest regimen now seems powerless to ruffle their serenity. Easy undress and agreeable diversion seem to be the orders of the day for everyone, until the dressing-bell sounds, when the Briton, at any rate, hastens to demonstrate his loyalty to the custom which he is but slowly imposing upon a reluctant Europe.

For the invalid, the day's routine may be thus concisely set down:—Rise 6.30; from 7 to 8, stroll and sit about in the Promenade, drinking water the while; 8.30, breakfast; 9.30 to 11.30, walk, either along the valley or up some of the easy gradients in the pine forests. Rest till 1 p.m., when lunch is taken. At 2, walk or go by carriage to one of the higher plateaux, afterwards continuing the drive, walking, or playing golf, according to inclination. At 4.30 soured milk is taken. From 5 to 6, rest. From 6 to 7, promenade and drink mineral waters again. At 7.30, dinner—not *always* "kurgemäss"—is taken. After this, entertainments are provided, which are so uninteresting, however, that few visitors are tempted to transgress the "cure" bedtime limit, which is 10.30.

In discussing the indications of a Spa, it would seem right, while not adhering over-slavishly to the official list, to give due weight to the opinion of the man on the spot. It is found, then, that in several medical publications the "Entfettungskur," or thinning treatment, occupies the first position. Indeed, it alone seems to have captured the imagination of the local caricaturist. Even were the removal of outward and visible fat the sole—as it may be the chief—indication for treatment there, Marienbad would continue to command a fairly numerous *clientèle*, as there are races which produce a large proportion of sedentary, beer-drinking, or money-spinning men, and of indolent, or luxurious women. For the Anglo-Saxon, however, it may be regarded chiefly as a resort where may be rectified a plethora less pronounced, and which has been engendered by some disproportion between the time given to business or to social amenities, and that devoted to exercise.

Taking now a rather wider view of the subject, we have first to consider the action of the two chief springs, the Kreuzbrunnen and the Ferdinandsbrunnen. These waters contain per mille about 5 parts of sodium sulphate, about 2 parts of sodium chloride, and about 1½ parts of sodium bicarbonate; while their other mineral constituents require decimal places only for their expression. Thus it will at once be seen that sodium sulphate, the most agreeable of the saline aperients, dominates their action. The minimum dose is generally about two glasses of the mineral water *per diem*; each glass containing just under 20 grains of sodium sulphate. This dose does not, as a rule, produce, during the first three days, active purgation. Some of it is removed by the kidneys, while some probably accumulates. In four days a mild aperient action is generally established, and continues throughout the course. The simplest view, then, of the treatment, as a whole, is to regard it as consisting in a mild, continuous depletion by the bowel. Whenever such treatment is desired, Marienbad is indicated.

Familiar as this action is, it is not always realised what far-reaching results may be obtained when it is continued without interruption for many successive weeks. This continuous depletion ultimately affects all the tissues. The result is a lessening of congestion of the fluids and, certainly, diminution in bulk of a tissue generally classed as solid, *i.e.*, fat. This depletion everyone at once associates with the unloading of the vascular system, portal and systemic; the influence on the pulmonary circuit is not so often considered. Wherever diminution of hyperæmia is desired, this is one of the most rational means of effecting it. The headache which has resisted all the newer analgesics, and has been only intermittently relieved by strong purgatives, may by this means be brought under permanent control. Again, while we recognise the increase of bodily activity which follows removal of fat from the muscles, we sometimes forget the advantage of carefully diminishing fatty infiltration of the heart. In quoting these few instances of conditions benefited by sodium sulphate, we must not forget that the troubles of the menopause may be considerably lightened by its use. Dr. Porges describes cases of albuminuria which he has observed at Marienbad, where, after taking the waters, this symptom disappeared permanently, and this (*pace* Widal) notwithstanding their fairly high common-salt content.

A writer, who omitted to mention other indications for Marienbad, would do well to preserve his incognito on revisiting it. A semi-official publication says that this place may justly be considered a "family Spa"; that is to say, one in which whole families may "enjoy" the cure without leaving any member behind. "The corpulent husband who is the subject of gout or rheumatism,—his wife afflicted with chronic metritis, and their daughter suffering from chlorosis, all find that nature has there provided them with the means of cure." The writer alluded to exhibits, indeed, a modesty very rare in Spa apologists, for the resources provided by nature are, in fact, even more numerous than he has suggested, and we may extend as well as confirm the application of his remarks as follows:—Marienbad has ferruginous peat said to be richer in iron than that at Franzenbad:—a carbonate of iron spring, stronger than those of Schwalbach or Spa:—a carbonate of calcium and magnesium spring stronger than the famous Georg-Viktor Quelle at Wildungen:—an alkaline saline carbonated spring resembling the Oberbrunnen at Salzbrunn:—springs so rich in free carbonic acid that they might compete with Nauheim and Oeynhausen for diseases of the heart or nervous system:—a spring with such low mineralisation that it may, at will, be claimed as a table water or (by those who lay stress on the potency induced by ionic dissociation), as one of the highest therapeutic value; and, finally, by warming and diluting the Kreuz or Ferdinandsbrunnen, there seems to be no reason why they should not fulfil all the 16 official indications of Karlsbad.

Could the building space difficulty be surmounted, and if the trumpet call of advertisement were strongly enough sounded, Marienbad might seriously deplete the visitors' lists of many other Spas, and consequently lose its almost unique charm. Fortunately, Marienbad does not advertise.

KARLSBAD.

KARLSBAD has been known for at least six centuries, and a summary of its history furnishes an interesting example of the *varium et mutabile* in balneological practice. According to Mr. Fraser Rae, who has evidently studied original documents, the water was used for the first two centuries for bathing only. During that time the custom was to give the baths at very high temperatures, and to enforce immersion for prolonged periods—until in fact the patient became covered with boils, when it was supposed that the morbid humours, having been brought to the surface, the sufferer was well on the way to recovery. The first innovation was made by a local physician, who advised that the water should be taken by the mouth also. Still, however, the element of brutality remained, for a preliminary course of drastic purgation was insisted upon. The dosage of the waters, too, was enormous, and to render this possible, patients were ordered to sit in hot rooms, so that elimination by the skin might be stimulated. The first real step in advance was made when it was directed that the water should be drunk at its source, and the dose regulated according to its effects. Even then it was considered that no benefit could result from less than ten glasses per diem. During all this time tens of thousands of patients were undergoing a form of treatment which we should now consider injurious; yet, as their numbers continuously increased, they must certainly have been in some way satisfied. The history of the last thirty years may be summarised by saying that the waters have been used more for drinking than for bathing, that the dosage has fallen to about 1—6 glasses per diem, and that the stereotyped diet of former days has been replaced by one planned to meet the needs of the individual. The last fixed dietetic regulation died hard: butter, formerly invariably proscribed, is more freely taken, and be it said, the butter at Karlsbad is exceedingly good. Topographically, Karlsbad has much in common with Marienbad, but it lies lower and is warmer. This, which is an advantage to the sedentary, is a disadvantage to those whose physical activity is less impaired.

The chief springs are practically identical in their mineralisation. They are hot and are about half as strong as the Kreuzbrunnen at Marienbad, from which, otherwise, they differ little in composition. Karlsbad is a very strenuous Spa, and its very atmosphere seems charged with intensity. No one should go there unless he intends to devote himself consistently to the treatment, for otherwise he might feel, and be felt to be, rather in the way. The visitor who wishes only for an open-air life, and such reduction of plethora as will ensue from regulated exercise and diet with a course of mineral waters, had better go to some other Spa. At Karlsbad so many of the promenaders look gravely ill that, while it may bring some comfort to the real invalid to observe how many others like himself have been sent to these healing waters, the man who seeks for prevention rather than cure will find the environment depressing. A local medical handbook states that more than half the patients seek relief from some form of indigestion. Another one says that any case of liver disease amenable to treatment should be sent there, while a pamphlet, which has recently been distributed broadcast, gives a miscellaneous list of sixteen chief indications, which include most of the complaints commonly dealt with at Spas. The present writer, however, regarding Karlsbad as a resort for serious cases, thinks it better to formulate no rules for their selection. That is a problem to be solved by the application of special knowledge to individual conditions; but certainly cases suitable only for the home, or the nursing home, should not be sent there, or to any other Spa.

GASTEIN.

THE splendidly picturesque Alpine situation of Gastein, and its invigorating but somewhat humid climate, are eminently suitable for statesmen, savants, and other elderly dignitaries, who, according to tradition, are attracted to this Wildbad.

Notwithstanding the very feeble mineralisation of its waters, a greater potency has been consistently attributed to them than to any other so-called indifferent, or simple thermal springs. Naturally, doubt has been cast upon the reality of their healing power. Dr. Burney Yeo writes :—"There is nothing whatever in the composition of the water to account for any therapeutic results obtained by bathing in it." Other medical writers seem to range themselves in the same camp by referring the benefits received largely to the influence of the climate. Such is not the opinion of the inhabitants of the district, who are enthusiastic bathers; nor has it been the view of a succession of shrewd observers, among them the late Prince Consort, in whose letters we find a warm commendation of these waters. A famous German chemist, finding by analysis nothing in them which would account for the benefit he believed he had received from their use, suggested that they might possess some physical properties, which would furnish the missing explanation. It is now known that in radioactivity they surpass all other known mineral waters. This discovery has been received at Gastein with the greatest enthusiasm, since it is hoped that therein is the explanation and justification of their world-wide reputation.

Experiments with naturally radio-active and with "emanation" water have yielded no conclusive result. In agreement with the observations of the Curies, they seem to show that in healthy persons the physiological action is nil. In a further series of observations, however, local applications caused not only subjective disturbance in damaged joints, but also an objective increase in swelling. These effects have been likened to the *crises thermales* of former days, which, when they occurred in the bathing course, were supposed to be the precursors of recovery.

The indications are those of the other Wildbäder, but, locally, stress is laid on the success of the treatment of functional nervous diseases, and, more fancifully, on the rejuvenating action of the waters.

Two practical hints may be given. The visitor should secure accommodation months in advance, and he should be prepared for a higher outlay, even than at other Austrian health resorts.

HEALTH RESORTS IN CANADA.

BY ANDREW MACPHAIL, M.D.,
McGill University, Montreal.

THERE are no "health resorts" in Canada which may be well compared with those in older communities. Life is not sufficiently organised, and Canadians do not fully appreciate the luxury of a leisurely convalescence. There is not yet a class of idle rich who require to divert themselves from their amusements by a period of illness. Occasional patients of this kind, who are attracted by the allurements of a health resort, prefer to obtain a change of scene and of climate at the same time. Accordingly they join the stream of travel to the United States and to European countries.

This is not to say that Canada is devoid of certain initial natural advantages, such as a dry, cold climate in winter, a dry, warm climate in summer, upland forests of pine, and foul-smelling springs of water. Whilst these resources might well be considered in any discussion of climatology, they are not in themselves, unless made available by art, sufficient to constitute a resort where health may be regained.

And yet there is much to attract and interest a visitor from England, who is not too ill to be benefited by a journey over seas. The voyage across the Atlantic is in itself a remedial measure. The best ships of the great transatlantic Canadian Steamship Companies are entirely satisfactory. There is a certain intimacy of life amongst the passengers, and the saloons are free from the turmoil which one finds in travelling to United States ports. There is also a trace of the old-fashioned kindness which used to be a feature of life on ship-board, when voyages were longer than they are in these days. Besides, the ocean passage occupies only four days, and after that there are a thousand miles of sailing up the still waters of the St. Lawrence before Montreal is reached.

Certain of the hotels in Canada have much to recommend them to persons who are more or less invalid; and it is common enough for Canadians to spend a week or two in them for purposes of recuperation. The reason is that these hotels are designed primarily for the comfort of travellers making long journeys, and are in reality part of the railway equipment. There is thus a continuity of management and a sense of familiarity with all the hotels belonging to the same system. For example, one of the Railway Companies owns hotels in Quebec, Montreal, Winnipeg, Banff, Vancouver, and Victoria, which are especially reserved for the comfort of travellers and not for their exploitation. An infirm person is passed on from one to the other with a kindly introduction and mention of his peculiar needs.

The Château Frontenac, in Quebec; the Place Viger, in Montreal; the Royal Alexandra, in Winnipeg; the Hotel Vancouver, in Vancouver; the Empress Hotel, in Victoria, belong to the same system, which owns, in addition, many smaller places, chiefly in the mountains. These are mainly used as health resorts, and two of them entirely so, namely, Banff and Caledonia Springs.

Banff well deserves a place amongst the health resorts of the world. It is easily accessible by a main line of railway. The hotel accommodation is excellent. There are good sanatoria for the invalid. The elevation is 4,521 feet. There are few spots in the world with a more complete aggregation of scenic features, within so small a compass—snow-covered mountains, warm valleys, a river with falls and still pools, sweet springs, ice-cold, and mineral springs with a temperature of 123. Of the Banff Hot Springs, the official analyst supplies the following report:—

Fixed solids in grains, per gallon:—

Chlorine (in chlorides) - - -	0·42 grains.
Sulphuric Acid (SO_3) - - - -	38·50 „
Silica (SiO_2) - - - -	2·31 „
Lime (CaO) - - - - - -	24.85 „
Magnesia (MgO) - - -	4·87 „
Alkalies (as Soda, Na_2O) - - -	0·62 „
Lithium - - - -	A decided trace.

Each gallon contains dissolved sulphuretted hydrogen to the amount of 0·3 grains (equivalent to 0·8 cubic inch).

In the vicinity of Banff mountain-climbing is well organised. Swiss guides and sheltering châlets are provided, and a summer may well be spent amongst the various hotels. Throughout the Rocky Mountains and the Selkirks, at intervals of about 50 miles, the Canadian Pacific Railway Company has provided small but excellent resorts. Some of these are the Mount Stephen House, Glacier House, and Sicamous Hotel, at the entrance to the Okanagan Valley, which enjoys a climate much like the south of England. From all these points trails lead up the valleys, and living is made most agreeable for those who require to gain strength and health.

Caledonia Springs, situated near to Montreal, have been of good repute for more than a century in the treatment of rheumatism and its allied manifestations. A competent physician is in residence, and every convenience is provided for invalids, including baths of all kinds. Analysis of three of the springs yields the following results:—

—	Caledonia Springs, Ontario, Canada.		
	Duncan.	Saline.	White Sulphur.
Chloride of sodium	122·50	64·41	38·43
„ potassium	·31	30	·23
„ calcium	2·87	—	—
„ magnesium	10·34	—	—
Bromide of sodium	—	·17	10
„ magnesium	·24	—	—
Nitrate of sodium	—	—	—
Iodide of sodium	—	·01	Trace
„ magnesium	·02	—	—
Sulphate of sodium	—	05	—
„ potassium	—	—	·18
„ magnesium	—	—	—
„ lime	—	—	—
Carbonate of magnesium	8·63	5·17	2·94
„ lime	1·26	1·17	2·10
„ soda	—	1·76	4·56
„ lithia	—	—	—
„ baryta	—	—	—
Phosphate of lime	—	—	—
Iron	Trace	Trace	Trace
Silica	·22	·41	·84
Alumina	Trace	Trace	·03
Carbonic acid	5·01	—	—
In 10,000 parts of water, grs.	151·40	73·45	49·41

In the same class as Caledonia Springs should be mentioned Ste. Catharine, near Niagara Falls. Of a less pretentious nature are St. Leon and Abenakis in Quebec.

Powerful forces are in operation to create a system of sanatoria in every Province for the care and treatment of patients suffering from tuberculosis. But these are more or less charitable in their intent; and they are not much frequented by the well-to-do. The Sanatorium at Gravenhurst in Ontario is the best known of these. For many years an attempt was made to establish in Ste. Agathe a resort for persons suffering from tuberculosis. This pretty village in the Laurentian Mountains is 60 miles north of Montreal; and at the same distance to the south is Saranac Lake, where Dr. Trudeau has his well-known sanatorium. The fame of Saranac Lake was rather too much for the Canadian village, and patients with tuberculosis are no longer provided for at Ste. Agathe. Dr. Kemp's sanatorium at St. Agathe has been converted into an inn, which is an admirable resort in autumn and winter.

St. Andrews in New Brunswick, on the Atlantic Coast, the Thousand Islands in the St. Lawrence above Montreal, and the Muskoka region in Northern Ontario are great pleasure grounds and favourite resorts for the enfeebled. They are all easily accessible, and in the early autumn are at their best. The convenience of invalids has been fully considered in the travelling and hotel arrangements. Another place of note is Murray Bay, below Quebec, where is the excellent Manoir Richelieu. There one may have the advantage of sea air and mountain air combined in a place of much natural beauty.

For those who are unable to endure a long ocean voyage, there are the vast inland Lakes of Canada, which are navigated by steamers as perfectly appointed as those which cross the Atlantic. These lakes are in reality inland seas of pure, cold water at an elevation of 600 feet. The effect upon the invalid is at once stimulating and sedative, and, as a result, rest, appetite, and sleep are promoted.

There are also peculiar conditions in the prairie country beyond the Lakes, which make for recovery. From May to October the intensity of the sunshine, the long daylight, the rapidity with which the ground dries after rain, the cool and bracing afternoon wind are all of value in stimulating metabolism and eliminating waste products. The prairies run quite to the foot of the mountains, where the patient may obtain in a few hours the benefits of intense insolation at mid-day, a low relative humidity of the atmosphere, very rapid and great changes of temperature at nightfall, all due to the small rainfall and the elevation above sea-level.

Up to this point I have been speaking only of those places, which have acquired merit in virtue of their natural advantages, and the adaptation of them to purposes of health by natural means. It yet remains to make mention of one place at least where health is restored by means of miracles. The best known of these temples of healing is the shrine of Ste. Anne de Beaupré, or *La Bonne Ste. Anne.*

It is situated 20 miles below Quebec, and may be reached by a railway which was constructed especially for the accommodation of pilgrims and pilgrimages, and appropriately blessed by Cardinal Taschereau, upon the occasion of its opening in 1889. For 20 years the shrine has been visited by seekers after health, the average yearly attendance being 150,000 persons. There is no place in the United States where miraculous cures are performed on any considerable scale, and citizens of that country, who expect benefit from that method of treatment are obliged to come to Quebec, or go to Mexico. Many marvellous cures are reported as a result of a visit to the shrine, which are attested to by a monument of crutches and *ex voto* offerings. The most hopeful moment for a visit is on Ste. Anne's day, July 26th, which fortunately falls at a time of year when large pilgrimages are easily handled by the railway companies.

But much more important to the seeker after health than formal resorts are the devices which Canadians themselves employ. In the vicinity of Montreal are numberless small camps, owned by groups of men, where they are in the habit of going to recuperate. Life in the woods is extremely simple, and it is a sovereign remedy for disturbance of the digestive and nervous systems. Canadians are a kindly people, and any visitor with some slight introduction can easily gain admission to these silent places.

THE WEST INDIES, WITH SPECIAL REFERENCE TO JAMAICA.

By J. A. COUTTS, M.B., F.R.C.P.,
Physician to the East London Hospital for Children.

It is no longer necessary to insist on the advantage of a change to a warmer climate for many invalids during our winter months. Every year the migration south takes place in increasing numbers, so that it is of growing importance for the practical physician to be able to offer definite guidance to the migrant according to his needs; that is to say, according to his malady and his temperament. The overcrowding of one district accentuates the need for alternative localities, and in addition to this the profession and the public are becoming increasingly alive to the necessity for individualisation. Instead of pointing out the disadvantages of competitive resorts, it will be a more pleasing and profitable task to bring to the notice of the profession some of the advantages offered by the Islands of the Caribbean Sea. A visit to the West Indies may be made in three ways. First, as a simple voyage out and home with a short stay at the terminal port. Secondly, as a voyage to a selected island, where a prolonged stay is made before returning to England. Thirdly, as a voyage to a certain island, when a smaller or cruising steamer is taken in which a fixed round trip is made before the return home. For the real invalid preference is to be given to the first or the second plan.

To borrow from the language of spa literature, the general indications for a voyage to the West Indies are, cases in which the requirements are, warmth with a comparatively small diurnal range of temperature. To the searcher after warmer climes too, who is already acquainted with Egypt and the Riviera, and who may have found the dryness of the one and the changeability of the other disadvantageous to him, a visit to the West Indies can be offered as an alternative.

Long ere this the West Indies would doubtless have become more popular as a resort for the invalid had it not been for the too prevalent idea that the islands are very hot-beds of "Yellow Jack" and malaria. That sporadic cases of yellow fever occur is not to be denied, but sanitation has almost stamped the complaint out, and the last epidemic, one of small dimensions, occurred many years ago. Statistics would easily show that more danger is incurred by the stayer at home from enteric than by the visitor to the West Indies from yellow fever. As with the last, the danger from malaria has been exaggerated. That mosquitoes, even the anopheles, are present at all seasons, and in all the islands is no doubt true. In Jamaica, however, I slept without a mosquito net, and I escaped unbitten. The real plague of the West Indies is not the mosquito but the all-prevalent tic, but the attack of the latter can be avoided by simple and appropriate means. Unfortunately, another source of dread for intending visitors has been furnished by the recent earthquake at Kingston. All records, however, show that a severe outbreak is seldom followed by another except after the lapse of many years.

It has been urged against a voyage to the West Indies that Jamaica and Barbados, the two ports usually first touched at, are each about 4,000 miles distant from these shores, and that this distance is too long for those in feeble health, without a break. I hold, on the contrary, that the unbroken continuity of this sufficiently long voyage is a factor of the first importance in the restoration of the invalid to health and vigour. Personally, I am indebted to such a voyage for the complete removal of certain vague and indefinite nervous troubles left by a severe attack of influenza, which had persisted for several months without improvement. It is in such cases of the sequelæ of influenza, in cases of retarded convalescence from typhoid and other fevers, and in some of those of so-called neurasthenia that the utmost benefit can be anticipated from a voyage in tropical seas. Given average weather the voyage cannot fail to be a pleasant one, and the time taken, 12 to 13 days each way, is too short to engender any feelings of monotony. The traveller then has practically the choice of two steamship lines by which he can attain his destination. The Elder Dempster line runs vessels every fortnight from Avonmouth to Kingston, Jamaica, and back, the time occupied by the return journey being 31 days. This will allow the visitor to remain from 5 to 11 days in Jamaica, according to the speed of the particular steamer chosen, or the other alternative may be adopted and the return voyage made after a prolonged stay in the Island.

The scenic attractions of Jamaica have been dealt with by Froude, Kingsley, and other writers, thus rendering any attempt at a detailed description superfluous on my part.

On landing at Kingston the temperature may be found uncomfortably warm, especially to one just off the sea, and who has left England during the winter months. But the coast is everywhere the hottest part in the island, and even there the temperature seldom rises above 90° F. This tolerable amount of heat, moreover, is tempered each day by a wind blowing in off the sea, and christened from its health-giving properties—a compliment to the medical profession—the Doctor. After sundown a wind blows in the reverse direction from the mountains towards the sea, and renders the nights cool and pleasant. But the visitor will not stop at Kingston, where there is now no accommodation, and but little left to see beyond the effects of the earthquake. Five or six miles out is a well-appointed hotel, the Constant Springs, which is readily reached by either the electric trams or private conveyance. Standing several hundred feet above the sea, amid lovely surroundings, the Constant Springs can be made a convenient basis for visiting any desired parts of the island. Another ideal spot to stop at is Mandeville. This little township is easily reached from Kingston in three or four hours, after a railway journey of continuous beauty and interest. Situated 2,000 feet above the sea level, the temperature is 10° below that on the coast, and may be compared with that of a warm summer's day in England. Froude wrote that Mandeville reminded him of Warwickshire, and the same impression will, doubtless, strike many at first. But soon one realises that it is a Warwickshire where the orange tree, in fruit and blossom, grows by the roadside, and where the hibiscus and poinsettia are prominent features in every garden. Accommodation for visitors is to be found at the Mandeville Hotel, and there are at least two comfortable boarding houses. Another place affording the advantage of cooler mountain air is Montego, the hotel here being situated 1,300 feet above the sea, and the scenery at this spot is reputedly as fine as any to be found in the island. On the sea-coast there are hotels at Spanish Town, Montego Bay, Port Antonio, and several other places.

For those desiring a longer time at sea, and the opportunity of visiting a number of the West Indian Islands, the Royal Mail Company have a well-arranged series of tours. In the shortest one, occupying about 33 days, the islands of Barbados, Grenada, St. Vincent, St. Lucia, Dominica, Montserrat, Antigua, Nevis, and St. Kitts are visited, and, with the exception of the two last, on both the outward and homeward voyages. All these islands differ widely from each other in size and the characteristics of their scenery, the only common feature being their unmistakable beauty. On the tour the stay at each island is a short one, a few hours at the most. In the event, however, of a passenger wishing to prolong his stay at any one particular island, the shipping company make arrangements by which he can either continue his journey by a succeeding steamer, or rejoin the one he came by on her return journey. There are two other and more extended tours, one occupying about 60 days and the other 75. By taking any of these the traveller has the means of regaining health and vigour in the pleasantest conceivable manner, visiting scenes and people calculated to greatly interest him.

It is, of course, the winter time that would generally be selected for such a voyage, but there is little difference between summer and winter temperatures in the tropics. It is well to remember, however, that the rainy months are May and October. No special clothing need be taken. During the first few days on the outward, and on the last few days of the return, journey, probably warmer clothing will be required. For the rest of the journey, and for a stay on any of the islands, ordinary summer flannels will be all that is comfortable and necessary.

It will have been noticed that I have practically confined my attention to Jamaica. This is because I know that island best, and because, according to my information, it is the only one that can be recommended with confidence for a prolonged stay. Conditions vary in the other islands in different years, but, if the traveller proceeds at once to Jamaica, he can immediately ascertain which of the others offers the greatest attractions in that particular season.

THE CANARIES.

WITH SPECIAL REFERENCE TO TENERIFFE.

By FREDERICK LISHMAN, M.D.

THE Canary Islands are situated between the 28th and the 29th degrees of north latitude, in close proximity to the Great African Desert. The climate is one of unusual interest and value to the medical profession. It is dry, without being parching; equable, without being enervating; and it is one of the very few stations which permit an invalid to live all the year round in complete immunity from too great heat. Although, therefore, like all the south European climates, it is primarily a winter resort, it offers unusual advantages to those whose delicacy demands something more than a winter abroad.

In the matter of climate, Teneriffe would naturally be compared with Madeira, but though it has affinities to that island, it differs from it in some very important points. Madeira, being 250 miles to the north, is removed from the influence of the African continent, while the climate of the Canary Islands is profoundly modified by it. It follows that, while Madeira is classified among the marine humid climates, Teneriffe is placed under those with moderate or slight humidity. Not only is it much less humid but the rainfall is 50 per cent. less.

The general features of Teneriffe, the largest of the Canary Islands, may be very briefly described. It is 52 miles long by 31 broad. Volcanic in its origin, its whole length is traversed by a lofty "cordillera," ranging from 3,000 feet at the eastern extremity to 8,000 feet at the centre of the island, and attaining an altitude of 12,200 feet at the peak itself. The abundant vegetation, spreading from the heights of the pine forests and chestnuts, through the broad sloping country to the very edge of the Atlantic, lends a general charm to the northern side of the island, and gives to Orotava its characteristic beauty. The climate of Orotava will be described as a general type, but, according to altitude and local features, several very different climates exist.

1. *Winds.*—Orotava is sheltered behind and on two sides by mountains, ranging from 4,000 to 12,000 feet, but it is freely exposed to the north. High winds are uncommon, and, as they are generally from the south or south-west, there is complete shelter. The prevailing wind is from the north-east. It is moderate in force, beginning shortly after sunrise and dying down towards sunset, to be replaced during the night by a gentle breeze from the mountains.

In summer the north-east trade-wind blows with great regularity. It is owing to this breeze, which blows for 250 days in the year, together with the influence of the mountain barrier giving shelter from the occasional south wind, that the heat in summer is so moderate.

2. *The temperature* is noteworthy for the absence of extremes, both of heat and cold.

The mean annual temperature is 66·8°.

The diurnal variation averages 13·8°, and is practically the same in winter and summer.

The annual variation is also very small.

The mean temperature of August, the hottest month, is 73·1°; that of January, the coolest month, is 61·3°, a difference of 11·8°. The extreme maximum and minimum shade temperatures recorded each year average 85·8° and 49·9°; evidence that invalids need not be hurried away from Orotava at the end of the winter season on the ground of heat.

3. *Rainfall.*—In Orotava the average for 22 years has been 14·3 inches.

During daytime rain fell on only 27·6 occasions in each year. The wettest months are usually December and January. From the end of April till October practically no rain falls. The occasion is rare when an invalid cannot be out of doors for the greater part of the day.

Owing to the porous soil, the heaviest rains soon disappear and leave no trace.

4. *The Mean Relative Humidity* is 71·2 per cent.

The actual number of overcast days averages 33 per annum.

5. *Sunshine.*—The amount of recorded bright sunshine averages 2,032 hours. The average daily bright sunshine is 5½ hours.

THE USES OF THE CLIMATE IN THE TREATMENT OF DISEASE.

1. *Phthisis.*—The cases which are likely to receive benefit are:—(*a*) Cases with feeble circulation, and disproportionate constitutional symptoms. (*b*) Catarrhal cases with pronounced bronchial element, laryngeal irritation, and frequent cough. (*c*) Cases associated with great nervous prostration and general breakdown from overwork. (*d*) Quiescent cavity cases. (*e*) Cases with arterial degeneration and cardiac complications. (*f*) Cases with albuminuria, and kidney affections generally. (*g*) Senile phthisis and all cases with undue susceptibility to cold.

Phthisis complicated with intestinal ulceration is apt to take an unfavourable course in the Canaries.

2. *Chronic bronchitis* is much benefited by the climate. When complicated with emphysema in elderly people, the good results are very striking. Such patients can, with advantage, reside permanently at Orotava, returning home for short visits in summer.

3. *Emphysema* attended with dry cough, is also benefited.

4. *Chronic Albuminuria.*—The high temperature, moderate humidity, the freedom from high winds, and absence of sudden changes of temperature, are sufficient to characterise it as one of the best climates for kidney disease.

A group specially suitable are those of *Subacute Bright's Disease* in young adults. In them the risk attendant on the period of transition from the large white kidney to the less dangerous granular contracted form may be largely obviated. Again, in *granular kidney*, the advantages which Teneriffe offers are so marked that a prolonged residence in the island may be recommended.

5. *Asthma.*—Some cases of spasmodic asthma are remarkably benefited, especially those intractable cases associated with bronchitis and emphysema.

6. *Delicate children of scrofulous tendency*, who have little reactive power, are extremely well suited to the climate.

7. *Rheumatoid arthritis* is benefited by winters spent in Teneriffe in alternation with spa treatment in summer.

Orotava has been taken as a type of the climate of Teneriffe, and the Canaries generally. From its natural advantages and the social attractions which it offers it is, and must remain, the favourite resort for the generality of invalids. It combines most good points with fewest drawbacks, and as a place of permanent residence it stands alone.

Laguna (2,000 feet) and Tacoronte (1,800 feet) within an hour or two of Orotava, afford excellent opportunities for a bracing change, when that is required.

The island of Grand Canary, only a few hours away by steamer, has some advantages of its own. It is nearer the African continent, and more under its influence. Like the resorts on the south-eastern side of Teneriffe (Güimar and Santa Cruz), Las Palmas has no shelter from the south, and is liable to greater extremes of heat with bursts of disagreeable sirocco.

Monte (1,400), within a short distance of Las Palmas, enjoys a great reputation, and is a delightful resort in summer.

The accommodation at Orotava is, as elsewhere in the islands, on the whole good and adequate to the comfort of invalids, though hotels always leave something to be desired. Those who prefer a more home life can be accommodated in various English houses where boarders are received. Living is generally on a liberal scale. The cost usually works out at from 6*s*. to 12*s*. a day.

VOYAGES TO THE EAST.

By ARNOLD CHAPLIN, M.D., F.R.C.P.,
Physician to the City of London Hospital for Diseases of the Chest.

I HAVE been asked to give a short account of the advantages of sea voyages to the East for the health seeker. As I have most knowledge of the routes traversed by the steamers of the P. and O. Company, it will be understood that my remarks refer chiefly to these routes and these steamers, though of course in some respects their application will be wider.

Until comparatively recently, a voyage through the Tropics to the East was regarded as a venture to be undertaken only by those of robust constitution, owing to the climate and other conditions encountered on the voyage. There are, however, cogent reasons for the rearrangement of our ideas on this subject. Most, if not all the disadvantages laid stress on in the past, have disappeared. Modern mail steamers are large and comfortable. They supply an excellent and varied diet, and in addition their medical officers have at their disposal appliances for dealing with the medical and surgical emergencies that might arise. Another modern advantage is that, owing to increased speed, a current of air is always perceptible even in the hottest weather. Passengers moreover can now reach Marseilles by a short overland journey and join the steamer at that port, thus avoiding the terrors of the Bay of Biscay. Yet another advantage is that the intervals between the ports of call are now so short that the tedium of sea travel is reduced to a minimum.

The Time to travel.—There is a period of the year during which travelling in India and the East is both pleasant and healthful, which may be sufficiently defined as from the middle of October to the middle of March. Fortunately, this is just the time when British invalids are most in need of warmth and sunshine. At the period stated the climate between Port Said and Hongkong, and of the East generally, is at its best, and is essentially equable. Of course, near the equator, at such places as Penang and Singapore, not much variation between heat and cold can be expected, but in northern and middle India at this period of the year, the climate leaves little to be desired. Those who are in good health may range from London to Shanghai and Japan with perfect freedom, but those who are seeking restitution of health would do well not to proceed further than Hongkong.

The Selection of suitable Cases for a Voyage.—This is a subject which has not been sufficiently studied by medical men, and the injudicious selection of cases for a sea voyage has often led to disastrous results. The advice, "Take a sea voyage," is apt to be given indiscriminately, and, since the selection of cases is all important, it is proposed to lay down precise rules for the guidance of physicians in this matter.

Of all the conditions of ill-health which benefit by a voyage to the East, the first place must be assigned to that ill-defined state of "want of tone," which is induced by overwork, worry, and bad hygienic surroundings. The total removal of the causes, combined with rest, new scenes, and a liberal supply of the purest air, are all to be obtained on board ship, and quickly work a cure. The appetite returns, sleep, which before was broken, becomes sound and refreshing, and the sense of well-being takes the place of languor or irritability.

Of the diseases most suitable for treatment by a voyage through the Tropics, early cases of chronic Bright's disease must be placed first. But, the more acute forms, and those in which cardio-vascular changes are advanced, do not come within the category of suitable cases. In addition to these, there is the large group of cases of renal insufficiency which rarely fails to improve by going a voyage to the East. The moist, warm atmosphere often establishes a profuse perspiration where diaphoretics have failed to have any effect. Indeed, many cases of slight nephritis have gone to the East in the winter, and have returned with no trace of albumen, or any other sign pointing to lesion of the renal organs.

Those liable to states of bronchial irritability, such as bronchitis and asthma, are considerably improved by a voyage eastward in the winter. The same may also be said of all conditions of chronic pulmonary disease, with the notable exception of tuberculosis. Bronchiectasis, chronic pleurisies,

EGYPT AND NORTH AFRICA.

By H. E. LEIGH CANNEY, M.D.

EGYPT is that portion of the Sahara, eight or ten miles broad for nine-tenths of its length, which the Nile has been able to cover with its annual deposit of Abyssinian mud carried down in its long journey through boundless wastes of the desert to the Mediterranean Sea. Standing on the cliffs overhanging the Nile valley we look out on the desert, the gift of the climate, and on Egypt, the gift of the Nile; for neither the sun nor the soil is the cause of the desert, but the climate alone.

The chief features of this desert climate are warmth, extreme dryness, both absolute and relative, and extreme purity of the air, especially from organic life, with marked diathermancy. In parts remote from water (the main factor modifying it) two striking features are observed: (*a*) the smaller daily range of temperature compared with adjoining districts influenced by river or cultivation; (*b*) the delay in the rise of the relative humidity till far into the night, and the low figure at which it then stands compared with such districts. Desert air, from its great dryness, imparts a sense of elasticity, lightness, and invigorating freshness, felt nowhere else save in the High Alps, and which is maintained even at high temperatures wherever the dryness is very notable. The characteristics of this air are most marked towards the centre of the desert, and notably so in Upper Egypt; and, as the limits of the north, south, and west of the Sahara are approached, the dryness, buoyancy, and diathermancy of the air diminishes, and the sky becomes less blue and more clouded. The important factor modifying the desert air is the neighbourhood of water capable of being taken up into the atmosphere by rapid evaporation owing to the extreme dryness of the air. Water being an essential to life, we naturally find the earlier known health resorts, and some of the more recent ones, situated in its proximity, and consequently in an atmosphere much modified by it. Thus, taking some North African resorts, we find one group, including Tangier, Morocco, Algiers, Hamman R'irha, Tunis, Tripoli, and Alexandria, all situated practically on the northern fringe of this desert, and under the influence of the Atlantic or the Mediterranean, and but slightly under that of the desert. Though in Africa, these resorts have a marine climate, mild, bracing, and tonic in the winter months, with a low maximum temperature and half the daily range exhibited by the desert resorts. Thus Algiers, situated in the same latitude as Malaga, Sicily, and South Greece, has a climate resembling these districts more than that of North Africa generally; it has been described, not inappropriately, as the Torquay of Africa. Though possessing the same relative humidity as Alexandria, it has 31 inches of rainfall to the latter's 8. It is considerably colder than the Egyptian health resorts, and even than Madeira, but it is warmer than the Riviera, though less dry; while its climate is less exciting than that of Nice or Cannes. From December to March the weather is like that of an English autumn, with twice as much sunshine and rain.

Biskra, indeed, the southern health resort of Algeria, is 4° of latitude north of Alexandria, and, though on the northern fringe of the Great Desert, 200 miles south of Algiers, is still some hundreds of miles north of Cairo. In climate it has characteristics of the Great Desert, yet it is not far enough inland to escape the influence of the Mediterranean, and has a rainfall closely comparable with that of Alexandria (about 6 to 8 inches).

We pass now to another group of health resorts, all, except Biskra, situated in the Nile Valley, and so practically within the Sahara. This group includes Biskra, Mena House, Helouan, Luxor, and Assouan. In all we find the Sahara climatic conditions modified by the proximity of the river or of cultivation. The influence of cultivation is (1) to induce a greater degree of absolute and relative humidity, (2) to rapidly lower the temperature towards sunset and the hours following, and (3) to induce a far lower minimum temperature than in the adjacent desert air at the same hour. So marked is this influence that, under it, one place may constantly show a minimum temperature 15° to 20° F. lower than another only a mile away. Continuous records have demonstrated the precise influence of cultivation or river on each of the health resorts of this group, and thus their climates may be classed as:—

(*a*) "Egyptian," or a desert climate largely influenced by cultivation; and

(*b*) "Saharan," or a desert climate very little influenced by cultivation.

Biskra, from its situation in the middle of a large oasis, and Cairo, by virtue of its position at the apex of the cultivated Delta, afford marked instances of the influence of cultivation. Assouan, at a point in the Nile valley destitute of vegetation, except as regards the islands in the Cataract, may be taken as the extreme example of the Saharan type. Intermediate between these we have Mena House, but slightly drier than Cairo, and Helouan and Luxor, approaching the Assouan type. The dry climate of the Egyptian health resorts is of the greatest importance in the treatment of disease. To consider its action: the drier the air, the greater its capacity for taking up moisture from the lungs. In consequence, oxygenation is far better performed than in damp, cold climates, and the hæmoglobin values are greatly improved. Hence, at the outset of treatment, we find a rapid improvement in tissue values, resulting in marked improvement in function; dyspepsia, for instance, will soon disappear. Cyanosis, a common feature in many cases suitable for treatment in Egypt, such as those of embarrassed right side of the heart associated with bronchitis or asthma, is rapidly relieved. The influence of the low absolute humidity of this climate, with its marked drying effect on the respiratory surface, becomes still greater when associated with the very low relative humidity of the desert, which enables the air rapidly to take up moisture from the surface of the body, and thus to greatly relieve the excretory function of the kidneys. Moreover, where the relative humidity is low the patient is able to pass a far greater length of time in the open than is possible where it is high—the former condition affording practically uninterrupted sunshine and absence of rain, mist and cloud. It has been observed that the air of the Engadine in winter is capable of taking up some 15 to 16 grains per 10 cubic feet more of inspired air than that of Assouan, the driest of the existing Egyptian health resorts. At some of these, however, the air closely approaches that of the Engadine in absolute dryness. But Egypt has the following advantages:—

(1) Consequent upon the higher temperature and the low relative humidity, the amount of water to be excreted by the lungs and kidneys is far less than that of the Engadine, owing to the high excretory action of the skin.

(2) The steady conditions of the Egyptian climate.

(3) The absence of snow or rain to interfere with continuous outdoor life, and the longer hours during which sitting out is possible.

(4) The absence of any difficulty for the months of March and April, so trying for those in or from the Engadine.

It is often supposed that the conditions of temperature in North Africa are practically uniform: a generally prevailing warmth. Such, however, is not the case, and neglect of this consideration in the choice of a resort suitable for a given case will detract from good results. The mean minimum temperature is much the same for all stations, but there is a considerable difference in the mean maximum; and it is this latter which is the best index of how far, at any particular station, the invalid's day may be spent in the open. This is of importance where warmth is required to insure action of the skin, as in Bright's disease, gouty affections, bronchitis, and certain lung affections. In considering the higher temperatures, it is found that in the neighbourhood of Cairo at least 10° F. and in upper Egypt at least 15° above that of northern Europe is required before the same feeling of warmth is experienced. 80° or 85° F. at Luxor or at Assouan is pleasant and refreshing, whereas 65° to 70° F. would be felt cold, especially if any wind were present. A maximum of 85° F. and a minimum of 52° will give the most desirable day in Upper Egypt. For the most part the winter months at all the stations are rather too cold by day and certainly at night. During November and March at Luxor, and during April at Helouan and Mena, the temperature may be called almost ideal. Thus in North Africa generally there are wide differences: we have the heavily dewed Algiers and the desert-surrounded Assouan where dew never falls, we have rainy Algiers and Tangier under Atlantic breezes and Alexandria comparatively dry. So we have the relatively cold winter months of Cairo and its neighbouring resorts—Mena House and Helouan—and the genial warmth of Luxor and Assouan.

The four principal health resorts are:—

(*a*) Mena House and Helouan in northern Egypt;

(*b*) Luxor and Assouan in southern Egypt.

They are all very well managed, and everything has been done to render life pleasant for a long stay. At all of these, English physicians have been in residence for many years.

Golf, tennis, and croquet can be obtained at each, and much of the time is spent in riding donkeys, camels and horses. The sanitation is excellent, and infectious illness rarely occurs, unless imported.

Mena House is situated eight miles west of Cairo, close to the great Pyramid, on the edge of the desert, and only a few feet above the cultivated land between it and Cairo. The temperature and its range are much the same as in Cairo, but the air is drier, far purer and fresher. The season is from November 1 to end of April, the first and last months being of special importance, while December, January, and February are generally too cold to be pleasant.

Helouan, situated in the eastern desert, 15 miles south of Cairo, and 2 miles from cultivated land, is 115 feet above the cultivated plain. It has important natural sulphur waters, and baths have recently been built on an elaborate plan. Helouan is a comfortable and well-appointed resort for invalids, who wish to be near Cairo, and yet enjoy a pure desert air only moderately influenced by proximity to cultivation and the river, and by the more distant cultivated delta. Its thermal waters, consisting of sulphur, saline, and chalybeate springs, are of considerable value in cases of lithæmia, gout, bronchial and pharyngeal catarrh, engorgement of the liver and other viscera, rheumatoid arthritis, sciatica, and stiff joints. The climatic conditions are much the same as at Mena House, but differ from it in the more favourable course taken by the relative humidity, especially at night. The climate is somewhat drier than at Mena House, but not quite as dry as at Luxor, and much less dry than that of Assouan. The season is the same as at Mena House.

Luxor is situated 418 miles south of Cairo by rail, in the midst of a plain of cultivated land which is four or five miles wide on either side of the river. Luxor has great interest from an antiquarian point of view, its beautiful temples and tombs being unrivalled throughout Egypt. It has long been known as a health resort, and is more equable in climate than northern Egypt. The mean winter maximum temperature (four months) is 6° or 7° higher than that at the northern resorts, this extra warmth being of great value in certain cases. The mean temperature is 62·4° in December, 59·7° in January, 63·3° in February, and 69·9° in March. The relative humidity is 52·2°

(average of two-hourly readings, December to March). The season for invalids is from about November 20 to the end of March, the month of March being of special value in all cases requiring marked dryness and warmth.

Assouan is situated 551 miles south of Cairo by rail, at the first cataract of the Nile, and is 22 hours from Cairo by train. There is hardly any cultivation on the west bank (the side of the prevailing wind) for many miles north and south, and very little on the east bank. Hence it is practically within the Nubian desert, the driest part of the Sahara. Assouan was selected as a health resort owing to its favourable position as regards the most important features of the Sahara climate. The immediate access to the desert for riding, and the proximity of the Cataract and river for sailing, are great attractions. The best time for invalids to arrive is about November 20, and it is advisable to remain until the end of March in most cases, especially where the dryness and warmth of March is important. It may, however, be a pleasant change to spend part of this month at Luxor, where the climatic conditions are then almost equally favourable. For the invalid, December and March are the best months, January and February being often rather cold, though warmer than elsewhere in Egypt. The average maximum temperature of the four winter months is 82·1° F. and the minimum 54·5°. The minimum is 5° warmer than Helouan or Luxor by night—a factor of importance in cases of albuminuria, Bright's disease, gout and bronchitis. The mean temperature is 65·6° in December, 64·3° in January, 67·4° in February, and 75·8° in March. There is no chill at sunset and the mornings are not so cold as elsewhere in Egypt. Assouan is the dryest health resort in the world. The relative humidity is 40·9. It is 28·2 per cent. drier than Mena House, 14·6 than Helouan, and 11·3 than Luxor. This adds a bracing quality to the air; the prevailing winds reaching Assouan over many hundreds of miles of desert destitute of any form of life.

Morbid conditions influenced beneficially by the climate of Egypt:—

A. *Pulmonary.*—(1) Phthisis—(*a*) Non-acute cases of first or second stage, with or without hæmorrhage. (*b*) Chronic quiescent phthisis. (*c*) Cases associated with bronchitis. With regard to cases with a tendency to recurrent pleurisy it may be remarked that not all patients are amenable to the strictness of the rules necessary for success. In such cases possibly better results would be obtained in the Alps or the Grand Canary.

(2) In asthma, especially where associated with bronchitis, gout or dyspepsia, very great benefit is to be obtained.

(3) Chronic bronchitis and emphysema are greatly relieved.

(4) Cases imperfectly convalescent from pneumonia and pleuro-pneumonia.

(5) Chronic nasal and pharyngeal catarrh.

B. *Bright's Disease and Albuminuria.*—The great relative dryness of the air, the high temperature, and the uniformity of the daily conditions, are of such value, that no alternative climate can be found for these cases. It is of importance that the patient should be sent to Egypt as early as possible.

C. *Rheumatoid Arthritis and Gouty Conditions of Joints.*—In these cases the feeble circulation, the cold, cyanotic and moist extremities will rapidly improve, and for them, also, the climatic indications and remarks given under Bright's disease must be equally emphasised. A course of baths and waters at Helouan, either before going to Assouan or on the return journey, may prove beneficent.

D. Cases of mental strain or breakdown from overwork, especially where associated with gout and arterio-sclerosis. Here again the benefit to be derived will be in proportion as the dangers ahead have been anticipated.

E. Excellent results are obtained in many other conditions, such as dyspepsia, neuritis, neuralgia (rheumatic, gouty, and malarial), neurasthenia, and insomnia.

The physician must decide whether in the conditions stated above a climate with marked dryness and special warmth is required. To suggest, as an alternative, in such cases as Bright's disease, asthma, bronchitis, rheumatoid arthritis, and even in neuralgia, sciatica, etc., such places as Algiers or Biskra, or even Cairo and its neighbourhood, is to deprive the patient of much of the advantage he otherwise would have obtained. It cannot too strongly be urged that suitable plans should be arranged before leaving home. Most patients with pulmonary lesions, asthma, bronchitis, catarrhal conditions of any organ, or albuminuria should travel by railway rather than by steamer on the Nile. There is probably no country or climate for which the guidance of those having special knowledge is so necessary.

HEALTH AND TRAVEL IN SOUTH AFRICA.

By CHARLES M. MURRAY, M.A., M.B., B.C., and
W. A. HAYES, M.R.C.S., L.R.C.P.

In this short paper, we propose first to deal with the facilities for travel; secondly, to indicate upon broad lines the nature of the climate, and, finally, to discuss the all-important questions —to invalids—of food and accommodation.

The railways of South Africa, which are now unsurpassed for comfort and luxury, afford easy access to an enormous tract of country, extending from the Zambesi, in 18° S. lat., to the southernmost portions of the Cape Colony, in lat. 34° 50′ S. But once the traveller leaves the train, he has to contend with considerable discomfort. Post carts and coaches carrying the mails are the principal means of conveyance. The roads, for the most part, are rough and dusty, and, away from the regular coach routes, they become mere tracks. The usual custom is for the post cart to leave the railway station shortly after the arrival of the train, and to journey steadily on hour after hour, entirely regardless of the state of the weather. For this reason post-cart travelling is intensely fatiguing and monotonous. Our advice to the visitor is to seek the counsel of someone who has a good local knowledge, and, with his aid, to secure the services of a private cart. If this is done, he can proceed at his leisure, and thus enjoy to the full every moment of his journey. We must, however, mention the fact that, though the roads are rough, there are few regions to which the ubiquitous motor car has not penetrated. To the ardent motorist, South Africa unfolds many thousands of miles of roads through beautiful and fascinating scenery.

But the style of travel to which South Africa is pre-eminently suited is the "trek." To trek with complete comfort, a party of three or more friends (and they must be friends) is necessary. A waggon is the *pièce de résistance*, and upon this the camp outfit is loaded. Each member of the party should be provided with a horse, and one or two spare ones should be taken, according as the party is a large or a small one. The waggon team may be of mules, but is more usually of oxen. The scheme of travel is to agree upon some rendezvous for the next camp, towards which the waggon slowly makes its way, whilst the rest of the party make expeditions into the surrounding country, picking up the waggon again towards evening. Travelling in this way, moving as the mood suggests, idling in the glorious sunshine, when some previous arduous day calls for a rest, and sleeping at night under the open sky, to our mind constitutes one of the most ideal methods of open-air cure that it is possible to conceive. And here in South Africa is the country *par excellence* in which to lead this open-air life. There are districts where, for months on end, rain is unknown, where game teems and wild flowers abound. Travel such as this does not require a long purse, as is often imagined. One of us, who has considerable personal experience, found that somewhere about £25 per month suffices to cover all expenses on such a trip, the actual cost per head diminishing considerably with each additional member; so that, with a party of three, £12 to £15 per month per head would probably suffice. Travel in this way is fraught with interest from one day's end to another. It has the great merit of making one independent of public accommodation, so that the pleasure of an enjoyable day is not ruined by spending a night in a malodorous "hotel." One may also travel very comfortably in much the same way in a Cape cart. This is a very convenient method where there are only two in the party. In this case a team of four good horses or mules, and a "boy" who understands the job and can cook well, are all that is necessary; but luggage must be very restricted.

In order to appreciate the range of climate obtainable in Africa south of the Zambesi, it is necessary to point out that the configuration of the country presents a series of unequal steps, rising from the sea on all sides, and attaining its greatest altitudes in the central positions. The striking feature of all this area is the uniformity of the average temperature, which is 62° F. This is due mostly to the decrease of the temperature, as one ascends above sea level, being almost exactly neutralised by the increase which would otherwise occur from increased solar radiation, due to nearer approach to the Equator. Geographically, a large portion of the area we are dealing with lies within the Temperate Zone, and the word "temperate" in every sense describes the climate. Frost is unknown on the coastal belt, but on the higher plateaux it is common in the winter. There are occasional falls of snow on the higher plateaux. The higher mountain peaks are frequently covered with snow, even as far south as 20 miles from Cape Town, but the strength of the sun is such that it never remains very long. A notable feature of the South African climate is the coolness of the nights. This is particularly noticeable on the higher plateaux. However warm the day may be, the evening invariably draws in with a marked drop of temperature.

The mean average rainfall of 278 stations given by Buchan in his rainfall of South Africa for 10 years, 1885–1894 = 23·79 inches. The rainfall is unevenly distributed, being much greater in the east, and gradually diminishing towards the west. The seasonal rainfall has a very definite distribution. The coastal belt has its wet season in the winter, during the months of May, June, July, and August, whilst the central plateaux have their rain in the summer months of October, November, December, and January. The intermediate country has its rain irregularly, getting the fag ends from both sources.

It will be seen that South Africa possesses two very markedly different systems of climate, yet both of them are temperate and enjoyable. The coastal belt has a long balmy summer of eight months or more, with a short, very wet winter, whilst the Karroo regions have a dry winter, and a summer during which whatever rain there is to fall may be expected. To describe these two systems in greater detail we shall commence with the coastal area. Here, as indeed throughout South Africa, a notable difference from the climate of Europe is the absence of marked seasonal changes. September may be said to be the spring month, vegetation is making strong growth after the winter soaking, and for days and weeks together the sky is bright and the sun pleasantly warm, while occasional showers of rain may occur up to the beginning of December, but these are generally light. January and February, and sometimes March, are our hottest months, but the heat even then is very mild, and never so great as to be unpleasant. The mornings are usually bright, calm, and cool, gradually warming up to mid-day, when, with the utmost regularity, a breeze springs up, and, increasing in freshness to five or six o'clock, dies away again with the sinking of the sun. To this we owe our immunity from oppressive heat. In April we may expect showery weather, and by the first week in May our winter rains begin. These are usually ushered in by a strong wind from the north-west, often assuming the proportions of a gale, which is followed in turn by heavy rain, from 2 to 3 inches often falling in 24 hours. This heavy fall is invariably succeeded by a calm, with floods of brilliant sunshine, which may last for a week, or even two or three, until the next heavy fall. Thus, although we have a greater indicated rainfall than in some parts ot England, we have very few wet days throughout the year.

Turning now to the Karroo system, we find almost a reverse condition of affairs. Here there is less definition of seasons. The rainy days are, unfortunately for the country, very few and far between, and occur during the summer time. The rain generally comes in the form of heavy showers accompanying thunderstorms. For the rest the weather is very bright, and, during the height of summer, often very hot, the thermometer registering 100° F. to 110° F. in the shade. But even then the dryness of the atmosphere makes the heat far less noticeable than would be imagined, whilst the evening coolness, together with the dryness of the atmosphere, prevent enervation. March, April, May, and June are considered the pick of the Karroo weather. At this time the "veld" is green and fresh after the rain. Later on, in July, August, and September, the veld becomes parched, though the weather is bright and cool. During these months the high winds from the north and north-west, which bring the rain to the coastal districts, are a source of unpleasantness, the dryness of the veld resulting in dust storms as the winds increase in violence.

To those visiting South Africa for the recovery of health, it will be evident from the foregoing that the climate is most admirably arranged. The existence of the two very distinct systems of seasons makes it possible for the visitor to explore the different regions under the most favourable conditions, so that it is posssible to go the whole circuit of the year without being in any region during its bad months.

Thus it is possible, at any given month of the year, to point out a district where the conditions are ideal for convalescence. This is strictly true as far as the climate *qua* climate is concerned. But here we are brought face to face with the great bugbear to South African travel—"Accommodation." Speaking of the country as a whole, hotel accommodation is of the very poorest, except in a limited number of the larger towns. We would urge, therefore, that for those who mean to visit South Africa for their health, and are not sufficiently convalescent to face rough travelling, the wisest course is to make their headquarters in or near one or other of the big towns and thence to explore the surrounding country, in the course of daily drives and rides.

The North-Western districts are undoubtedly the most suited for phthisical cases, while heart cases will probably do best along the coast between Cape Town and Durban. A mistake is often made in sending a phthisical patient straight from the sea voyage up to the Karroo or North-West, forgetting that most of that country is from 3,000 to 5,000 feet about the sea level. In our opinion all cases, particularly where there is any heart weakness, would do far better to remain for some weeks upon the coast. The change from England is sufficient to produce very satisfactory improvement in a short time. When the patient has in this way been gradually introduced to the new climate and novel conditions of life, let him then venture further afield. The class of case to which the climate and general conditions are most suited is the early or suspicious case of lung disease and cases of general debility in the otherwise young and active. For such cases we can imagine no better form of treatment than a "trek" across some part of this country. This is a means at once of providing constant interest and employment, as well as of keeping the patient away from the dust and other evils of the towns, and, above all, keeping him day and night in the open air.

NOTES AND COMMENTS.

Credulity and Mockery.—Balneology has, throughout its history, been the subject of conflict between the somewhat excessive faith of its local believers and undue scoffing from outside. Both parties to the dispute have claims upon our sympathy. It devolves upon the man at the Spa to use waters which defy exact analysis, and whose physiological action cannot be stated with precision. Unless he is sufficiently enthusiastic regarding these waters, his place of usefulness is not at a Spa. He will forfeit the confidence of his patients and so lose all control over their actions. They would resent, moreover, any little clinical lectures, with nicely balanced expressions of scientific doubt, in the manner accounted orthodox by the junior assistant physician. In his environment he must use the potent therapeutic factor of suggestion. About this, however, there is a magic under the spell of which the suggester is himself apt to fall. He thus becomes imbued with that credulity which—no less than the frequent crudity of its expression—has provoked remonstrance from outside. This has sometimes been conveyed by the gentle art of raillery, as in this terse and delightful example from Henri Taine, with reference to certain Pyrenean springs: "In the time of Francis the First they were known as arquebusade waters; wounded soldiers were sent there. Now they cure ailments of the throat and chest. In a hundred years' time they will be curing something else: every century medicine advances a step. A famous physician one day said to his pupils: 'Make haste, gentlemen, to use this remedy—while it still cures!'"—But the bludgeoning method of criticism, too, has been adopted, as by the author who recently wrote of "the humbug that still clings around the Spas."

The Tertium Quid.—There is, however, yet another aspect of the subject. The "alterative" of our student days has been revived in the more subtle "activator" of the neo-German School. It would seem to have been this which recently inspired a metropolitan physician to the following somewhat transcendental utterance: "I doubt very much that mineral waters wash out this and purge away that, or that their action, if chemical in any sense, is of that clumsy sort. Rather would I think of them as full of a nascent activity, aiding here, persuading in another quarter, stimulating there in accord with those infinite possibilities wrapped up in the energy of all animate existences." Thus metaphysics linger, though the Brunnen-Geist has vanished, and the Naiads are no more.

Retrospective.—Not so long ago in the nation's time of stress, we were continually exhorted to trust to the man on the spot. It is in the spirit of that advice, sound in the main, that this Special Number has been edited. Locally written descriptions have been largely requisitioned, and local opinion has been considered by all the other authors, as well as by its Editor, who is responsible for the unsigned notices. Owing to considerations of space some of the more accessible localities only have been chosen for description; but this principle has been liberally interpreted where Greater Britain is concerned. The endeavour has been to make this number a complement to, rather than an epitome of, any of the standard works. The omission of a separate paper on the French Riviera is due to its proposed author having at the last moment been attacked by influenza, a scourge which seems lately to have acquired a special virulence in that sunny region. In the descriptions of Spas the intention has been to convey in brief terms a characterisation of some which have been considered typically useful for patients suffering from the ailments specially dealt with at these resorts. This section has intentionally been made shorter than those dealing with climatic resorts, because, notwithstanding the blandishments of the balneologists and their undeniable successes, fewer people seek for health at the spring head or in the bath tub than under the open skies of heaven. Moreover, a visit to a Spa implies the idea of treatment for a definite ailment, and though it is easy to label the Spas with their "indications," factor even more important, such as the constitution of the patient and the personality of the medical men who are to carry out the treatment, could not be dealt with adequately here—nor perhaps at all in print.

Every apology is offered to authors whose papers have been compressed through want of space. In extenuation it may be urged that, but for a general consent to that process, the field of view offered to the reader would have been much more limited both in scope and diversity.

In conclusion, the Editor of this Special Number would express his sincerest thanks to Sir Hermann Weber, who, in his retirement, has contributed the opening article.

Neville Wood, M.D., M.R.C.P.,
Editor of the Special Number.

Notes by the Way.

Our New Building.

We have not yet been able to take possession of our new building as, unfortunately, several unforeseen circumstances have arisen which have caused delay and hindered the workmen. Everything, however, is now being pushed on as rapidly as possible, and, on the first page of this number, we are able to publish an illustration of the building.

* * * *

The Special Number.

We have no doubt that our subscribers will receive this issue on Health Resorts and Climatic Treatment with as much interest as they have always received our Special Numbers. It is not easy for those, outside the Editorial chair, to conceive the enormous amount of work which the compilation of such an issue entails, and the Controlling Editor considers, therefore, that an expression of thanks is due to Dr. Neville Wood for the able manner in which he has specially collected, arranged, and edited this number. His wide climatological experience has materially contributed to the success of the work, and we are sure that the result of his efforts will be of considerable professional value to our readers.

NAMES OF PLACES

REFERRED TO IN THIS NUMBER.

A.

Page
Abbazia - 4, 7, 8
Aberdeen - 75
Acireale - 7
Adelboden - 103
Africa, South - 22, 205
,, North - 198
Aix-la-Chapelle - 82
Aix-les-Bains - 134, 146
Ajaccio - 4
Alassio - 5, 123
Aldeburgh - 58
Alexandria - 198
Algeciras - 107, 111
Algeria - 4
Algiers - 13, 198
Altadore - 88
Amalfi - 7, 124
Ambleside - 84
Arcachon - 8, 14, 152
Arco - 8
Ardglass - 93
Argelès - 151
Arosa - 97, 101, 103
Assouan - 3, 199, 200, 201, 202, 203
Australia - 22
Azores - 5

B.

Baden-Baden - 166
Badenweiler - 158
Balholmen - 127, 128
Ballintrae - 87, 92
Ballycastle - 87, 89, 90, 92
Ballynahinch - 89
Banff - 182
Bangor - 87
Basle - 98
Bath - 66
Baveno - 116
Beaulieu - 5
Belfast - 88
Belgium—Spa - 154
Bellagio - 117
Berck-sur-Mer - 14
Bergen - 126, 127
Berne - 98
Berwick - 56, 77
Bexhill - 51, 54
Biarritz - 8, 149
Biskra - 199, 200
Black Forest - 10, 19
Bognor - 51, 54
Bonchurch - 9
Bordighera - 5, 123
Bournemouth - 9, 51, 53, 55
Braemar - 73, 74
Bray - 87, 93
Bridge of Allan - 73, 79
Bridlington Quay - 59
Brighton - 9, 51, 54
Broadstairs - 50, 52, 54
Budleigh-Salterton - 9
Bundoran - 87, 92
Buxton - 84

C.

Cadenabbia - 117
Cairo - 3, 199, 200

Page
Canada - 22, 181, 204
Canaries - 5, 13, 190
Cannes - 5
Cannet - 5, 6
Cap Martin - 5
Capri - 7, 124
Capvern - 133
Carinthia - 10
Carlsbad (*see also* under K.) - 41, 64
Castellamare-di-Stabia - 7, 124
Castlerock - 87, 90, 92
Catania - 7
Caux - 9, 103
Channel Islands - 10
Chateau d'Oex - 103
Châtel-Guyon - 140
Cheltenham - 64
Chiavari - 7
Christiania - 128
Church Stretton - 70
Cimiez - 5, 6
Clacton - 58
Clarens - 8
Cleethorpes - 59
Clifton - 10
Contrexéville - 131, 149
Cordilleras - 97
Corfu - 4, 8
Cornobbio - 117
Costebelle - 5
Crawford - 73
Crieff - 80
Cromer - 56, 59
Crowborough - 13
Cruden Bay - 77

D.

Davos - 30, 98, 101, 102
Dawlish - 9
Dollymount - 91
Donaghadee - 87, 89, 90
Dover - 50, 52
Droitwich - 65
Dublin (Larch Hill) - 88
Dunbar - 77
Dunblane - 73, 80

E.

East, Voyages to - 194
Eastbourne - 9, 51, 53, 54
Egypt - 3, 4
,, Health Resorts - 198
Elgin - 75, 76
Ems - 31, 159
Engadine - 30
England (rainfall) - 85
Estorils, The Three - 104
Evian - 134, 148
Exmouth - 9
Eze - 5

F.

Falmouth - 9, 52, 53, 55
Felixstowe - 58
Filey - 58
Florence - 8
Folkestone - 9, 50, 54

Page
Forres - 76
Fortwilliam - 75
Frinton - 58

G.

Gastein - 179
Geneva - 118
Genoa - 8, 120, 123
Gibraltar - 107
Girgenti - 7, 124
Glengarriff - 10, 86, 88, 90, 94
Glion - 118
Gorbio - 5, 6
Grasmere - 85
Grasse - 5, 6
Greencastle - 87
Greenock - 75
Greenore - 93
Greystones - 87, 88, 94
Grindelwald - 103
Gudvangen - 127

H.

Hall - 14
Hamman R'irha - 198
Harrogate - 68, 82
Hartz Mountains - 10, 19
Hastings and St. Leonards - 9, 51, 54
Helouan - 3, 199, 201
Hindhead - 13
Holmenkollen - 128
Homburg - 41, 64, 164
Hove - 51, 54
Howth - 87
Hunstanton - 59
Hyères - 5

I.

Innsbruck - 8
Interlaken - 118
Ireland Health Resorts - 83
,, (rainfall) - 85
Ischia - 7
Italian Lakes - 115

K.

Karlsbad (*see also* under C.) - 178
Kilkee - 87, 94
Kingston - 188
Kingstown - 87
Kissingen - 14, 166
Knockbreda - 88
Kreuznach - 14, 26, 27, 165
Kylemore - 84

L.

La Bourboule - 138
Lago di Como - 116
,, ,, Garda - 117
,, ,, Maggiore - 115
,, ,, Orta - 117
,, ,, Varese - 116
Lahinch - 90
Las Palmas - 193
Lausanne - 118
Laveno - 116
Leamington - 64
Leen - 127
Les Avants - 9, 108, 118
Leysin - 101, 103
Lisdoonvarna - 89
Littlehampton - 51
Llandrindod - 71

Page
Llandudno - 10
Locarno - 116
London - 15, 19, 20, 29, 30, 44, 47, 49
Lossiemouth - 76
Lowestoft - 56, 58
Lucan - 89
Lucerne - 118
Luxor - 3, 199, 201

M.

Madeira - 5, 13, 190
Malberg - 31
Mallow - 89
Malvern - 13, 65
Mandeville - 188
Mangerton - 84
Maremma - 124
Margate - 56, 57, 58
Marienbad - 41, 64, 174
Martigny - 132, 133
Matlock - 65
Melcombe Regis - 51
Mena House - 3, 199, 201
Menaggio - 117
Mentone - 6, 123
Meran - 8
Merok - 127, 128
Midland Counties - 47
Moffat - 73, 78, 82
Mogador - 4
Mont Dore - 137
Montana - 103
Monte Carlo - 5
Montego - 188
Montreal - 182
Montreux - 8, 118
Morocco - 198
Murray Bay - 184

N.

Næs - 127
Naples - 7, 124
Nauheim - 36, 169, 173
Nervi - 7, 123
Neuenahr - 41, 161
Newcastle, co. Down - 84, 87, 90, 93
,, co. Wicklow - 88
Nice - 5, 6
Norway - 125

O.

Odde - 127, 128
Oeynhausen - 168
Oneglia - 123
Ontario - 184
Orotava - 191
Ospedaletti - 123

P.

Palermo - 7, 124
Pallanza - 116
Pau - 8, 151
Pegli - 7
Penzance - 9
Pisa - 7, 124
Plombières - 144
Port Salon - 87, 90
,, Stewart - 87, 90, 92
Portmarnock - 90
Portofino - 7, 124
Portrush - 87, 89, 90, 91, 92
Portuguese Riviera, The Three Estorils 104
Pwllheli - 10

Q.

Quebec - 182
Queenstown - 10, 85, 86, 88, 90, 94

R.

Page
Ramsgate - 50, 52, 54
Rapallo - 7, 124
Riva - 8
Riviera, Eastern - 5, 7
„ Western - 4, 5, 7, 8
„ Italian - 119
„ Portuguese - 91
Rome - 7
Ronda - 107, 113
Rosapenna - 87, 90
Rostrevor - 88, 93
Rothesay - 75, 78
Rothorn - 95
Royat - 135

S.

St. Agathe - 184
„ Andrews - 77, 184
„ Beatenberg - 118
„ Lawrence - 9
„ Margaret's Bay - 50
„ Moritz - 101, 103
„ Raphael - 5
Salcombe - 9
Salz Kammergut - 10
San Remo - 5, 123
Sand Fiord - 127
Santa Margherita - 7, 124
Scarborough - 59
Schlangenbad - 156
Schwalbach - 173
Scilly Isles - 10, 52
Scotland (rainfall) - 85
„ Health resorts - 85
Seaford - 51
Sestri Levante - 7
Sheerness - 56
Sicily - 124
Sidmouth - 9, 51
Skegness - 59
Skye - 84
Soden - 14
Sorrento - 7, 124
Southend - 58
Southwold - 58
Spa (Belgium) - 154
Speyside - 73
Spezia - 7, 123
Spiez - 117
Stockton-on-Tees - 56
Stonehaven - 77
Strathpeffer - 73, 81
Stresa - 116
Swanage - 51
Swiss Lakes - 117
Syracuse - 7, 124

T.

Tangiers - 4, 198
Taormina - 7, 124
Tarasp-Schuls - 64
Teignmouth - 9, 51

Page
Teneriffe - 190
Territet - 8, 118
Thanet, Isle of - 14
Thonon - 134
Thoune - 115, 117
Thuringia - 10, 19
Thurso - 76
Torquay - 9, 51, 55, 86
Tralee - 89
Tripoli - 198
Tunbridge-Wells - 13
Tunis - 198
Tyrol - 10, 19

U.

Uriage - 14

V.

Valescure - 5
Vancouver - 182
Varenna - 117
Vence - 5, 7
Venice - 8
Ventimiglia - 123
Ventnor - 9, 55, 86
Vevey - 8, 118
Viareggio - 7
Vichy - 41, 131, 141
Victoria - 182
Villa d'Este - 117
Vittel - 132, 143
Vosges Mountains - 19

W.

Walton - 58
Warrenpoint - 87, 93
Westgate-on-Sea - 58
West Indies - 186
Weymouth - 51
Whitby - 56, 59
Wiesbaden - 39, 163
Wight, Isle of - 51
Wildbad - 157
Wildbäder (Germany) - 155
Wildungen - 170
Winnipeg - 182
Woodhall Spa - 65
Worthing - 9, 51, 54
Wythburn - 84

Y.

Yarmouth - 58

Z.

Zermatt - 97

NAMES OF DISEASES
SPECIFICALLY REFERRED TO IN THIS NUMBER.

A.

Page
Albuminuria 4, 121, 144, 161, 177, 192, 202, 204
Alcoholism - 16, 197
Amenorrhœa - 88, 141, 142
Anæmia 43, 69, 70, 72, 88, 94, 100, 113, 136, 142, 154, 163, 172, 196

Page
Apoplexy - 8
Appendicitis - 141
Arterio-sclerosis 4, 39, 43, 133, 144, 166, 167, 196, 204
Asthma 1, 30, 33, 66, 76, 88, 94, 121, 136, 138, 144, 158, 161, 192, 195, 204

B.

Page

Bone diseases - - - - - 88
Bronchial asthma - - - 101
,, catarrh - - - 4, 70
Bronchiectasis - - - 13, 195
Bronchitis 1, 13, 33, 57, 66, 79, 88, 94, 113, 121, 136, 138, 140, 144, 152, 158, 192, 195, 202–204
Bronchorrhœa - - - - - 89

C.

Cardiac affections 34, 113, 114, 152, 158, 166, 167, 169, 172, 173, 196
,, insufficiency - - - 136
,, mischief (children) - - 13
,, weakness - - 39, 44, 163, 169
Catarrhs, respiratory 31, 65, 70, 152, 160, 162, 163
Chlorosis - 19, 69, 88, 113, 136, 177, 196
Cholelithiasis - - - - - 17, 68
Cirrhosis of liver - - - 17, 196
Colitis, muco-membranous 69, 141, 145, 196
Constipation - - - 17, 141, 167
Convalescence delayed 69, 70, 79, 81, 87, 92, 111, 114, 150, 199
Cyanosis - - - - - - 200
Cystitis - - - - 144, 149

D.

Debility, general - - 69, 70, 93, 100
Diabetes - - 72, 111, 140, 142, 149, 161
Digestive disorders - - - - 88
Dysmenorrhœa - - - - 141
Dyspepsia 17, 72, 88, 89, 92, 136, 152, 158, 167, 199, 200, 204

E.

Emphysema 4, 17, 21, 33, 88, 100, 136, 138, 140, 152, 158, 192, 204

F.

Fibrositis - - - 63, 65, 148

G.

Gall-stones - - - 1, 161
Gastritis - - - 142, 162
Gastro-intestinal catarrh - 68, 82, 144
Glycosuria - - - 64, 68, 72
Gout 1, 4, 39, 61, 64, 65, 66, 68, 70, 72, 79, 80, 82, 89, 122, 142, 144, 145, 148, 149, 158, 160, 161, 162, 177, 202
Gouty conditions - - 136, 171
Gravel - - - - - 144, 161
,, cystitis - - - - - 142

H.

Hæmorrhoids - - - 64
Heart affections - - - - - 34
,, valvular disease of - 13, 17, 37, 100
Hepatic disorders 64, 72, 80, 88, 142, 158, 196, 202
,, inadequacy - - - 68

I.

Insanity - - - - - - 16
Insomnia - 21, 66, 70, 87, 92, 114, 127, 204
Intestinal complaints (tropical) - - 196

L.

Page

Laryngeal tubercle - - - 121
,, and bronchial affections - 111
Laryngitis - - - 88, 89, 94, 138
Lithæmia - - - - 144, 202
Lithiasis biliary - - - - 142
Leucorrhœa - - - - - 65

M.

Malaria - - - 100, 187
Metritis - - - - 141, 177

N.

Nasal disorders - - 28, 89, 138, 204
Naso-pharyngeal affections - 140, 152, 204
Nephritis - - - 12, 111
Nervous affections - 16, 43, 45, 66, 70, 111, 122, 152, 157, 158, 168, 180, 187
,, debility - - 66, 87, 92, 114
Neuralgia - - 17, 111, 114, 145, 204
Neurasthenia - 69, 70, 87, 94, 100, 112, 113, 114, 124, 127, 144, 145, 148, 150, 187, 204
Neuritis - - - 45, 148, 204

O.

Old age, failure in - - - - 1
Overwork, results of - 70, 72, 87, 100, 112, 124, 127, 156, 157, 158, 204

P.

Paralysis - - - - 158
Pharyngitis - - - - 89, 136
Phthisis - 24, 53, 55, 57, 72, 94, 95, 113, 114, 121, 146, 151, 162, 192, 203
Plethora - - 43, 64, 162, 175, 179
Pleurisy - - - - 33, 195
Pneumonia - - - 1, 33, 204
Pulmonary tuberculosis - 12, 16, 21, 25, 51, 55, 88, 111, 138

R.

Renal diseases 21, 89, 101, 134, 147, 148, 158, 192, 195, 203
Respiratory catarrh - - 31, 65, 70
Rheumatism 1, 4, 65, 66, 67, 72, 79, 80, 82, 89, 94, 100, 142, 145, 148, 158, 161, 163, 166, 177, 196
Rheumatoid arthritis 63, 65, 67, 69, 70, 72, 82, 89, 122, 148, 158, 163, 192, 202, 204

S.

Sciatica - - - - 65, 148, 202
Scrofula - - 26, 57, 88, 106, 162, 163, 166
Scrofula in children - - 14, 27, 192
Skin diseases 68, 79, 80, 82, 106, 136, 139, 144, 148
Spinal deformities - - - - 88
Surgical tuberculosis - - - 57, 69
Synovitis - - - - - 148

T.

Tuberculosis 21, 27, 54, 57, 69, 100, 152, 158, 184, 196

U.

Urinary diseases - - 131, 161, 170
Uterine tumours - - - 65, 166

V.

Varicose veins - - - - 17
Vesical catarrh - - - - 111
,, disease - - - - 131

THE PRACTITIONER.

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REMARKS ON THE DIAGNOSIS OF ILIAC SWELLINGS.[1]

By **WILLIAM HENRY BATTLE, F.R.C.S.,**
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IN a consideration of the swellings that may be found in the iliac fossæ, it is well to look at the subject from the standpoint that any kind of mischief on the right side may be simulated by some inflammatory condition of that most troublesome of modern possessions, a diseased appendix. This plays such a large part in the production of iliac swellings that the statement will not excite surprise. Some people appear to class abdominal conditions into two varieties: those which require operation, and those which get well without, not in any way attempting to make an exact diagnosis. We are not likely to advance very much in our powers of diagnosis, if we always wait before giving an opinion as to the nature of a swelling brought to us "until the cloth has been lifted."

In order that we may be as thorough as possible in our consideration of the subject within the limits at our disposal, it will be well to exclude tumours which arise from the bones of the pelvis (osteo sarcomata); sarcomata of the abdominal wall (which appear to have a predilection for this region); enlargements of the iliac glands, whether primary or secondary; aneurysms of the large arteries; and abscesses dependent upon caries of the vertebræ, bones of the pelvis, or disease of the sacro-iliac joint.

Regarding the more slowly forming swellings, which alone demand our attention now, the same questions require an answer, when a swelling is found in the iliac fossa, as when one is discovered in any other part of the body.

Is it inflammatory? If so, is it subsiding, or advancing? Has it progressed to the formation of pus? If non-inflammatory, is it simple or malignant, solid or cystic, and where did it commence? In one of the structures, which normally occupy the iliac fossa, or has it extended into it from a neighbouring organ?

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[1] Part of this paper was read before the Brixton Medical Society.

These swellings may be grouped into three classes:—(1) Those which arise in some structure normally present in the iliac fossa. (2) Those which extend into the iliac fossa from below. (3) Those which invade it from above.

In the first class should be considered—(1) Accumulations of fæcal matter in the large bowel. (2) Enterospasm. (3) Intussusception. (4) Glandular enlargements. (5) Distension of the ureter. (6) New growths of the large bowel. (7) Inflammatory swellings. (8) Hyperplastic tuberculosis of the cæcum. (9) Actino-mycosis.

In the second class are mainly affections of the Fallopian tube and ovary—(1) Pyosalpinx. (2) Hæmatocele of the broad ligament. (3) Ovarian tumours.

In the third class—(1) Enlargements of the gall bladder. (2) Movable kidney. (3) Hydronephrosis, pyonephrosis and growths of the kidney. (4) Malignant disease of the colon, or sigmoid flexure.

Other abdominal tumours may be found, which have wandered into one or the other fossa in consequence of the looseness of their attachments, such as an ovarian tumour with a long pedicle, a wandering spleen, and tumours of the small intestine. Cysts of the tail of the pancreas are sometimes very movable, but cannot be carried quite so far as the iliac fossa.

An accumulation of fæcal matter in some part of the large bowel is a condition for which medical help is frequently sought. Usually the diagnosis is not difficult, but the possibility of malignant disease must not be too readily put on one side. In the iliac fossa it is possible in the majority to diagnose the nature of the swelling on account of its doughy nature. Occasionally a difficulty will arise, as in the case of a stout patient, a women of over 50 years of age, recently under care in St. Thomas's Hospital, in whom the thickness of the abdominal wall interfered with the satisfactory examination of a swelling of two to three months' duration. Purgatives had produced no effect, so abdominal exploration was carried out in order that we might exclude the possibility of malignant growth of the bowel. A thickened and pouched cæcum with a fæcal lump was found, but no growth.

Some years ago, a lady was brought to me with three swellings in the upper part of the left iliac fossa, all of them hard and in the line of the descending colon and cæcum. They were much of a size, one or two certainly appeared to be doughy, but as she was somewhat stout it was impossible to be certain. Repeated purgation got rid of all but one of these swellings; this was a ring carcinoma of the upper sigmoid, which I excised. Her symptoms were very slight, occasional griping pain in the left side of the abdomen, with constipation. No difficulty should be experienced in diagnosing those fæcal accumulations of larger size, which extend upwards from a fæcal impaction in the rectum.

On more than one occasion, patients have been seen on account of painful swellings in the left iliac fossa of varying duration. These were rounded and tender to pressure in the line of the early part of the sigmoid flexure, rather smaller than an egg and somewhat longer. The patients have mostly been men of some intelligence, but overworked and nervous. In one, there was hæmorrhage from the rectum, due to internal hæmorrhoids, whilst he was also the subject of locomotor ataxy. The tumour disappeared under anæsthetic, and the removal of the hæmorrhoids arrested the loss of blood. Rest and a tonic, with the employment of laxatives, will generally suffice to effect a cure. A malignant growth had been feared in nearly all instances, but the trouble was a localised enterospasm. It must be remembered that, in carcinoma of the sigmoid, the tumour may not be present in the iliac fossa at all times; it may not be there at the moment when you make your examination of the patient, so, if symptoms and history point to the presence of a growth, exploration should be done, for it may be too late if the surgeon hesitates until a tumour can be felt.

The sausage-shaped tumour and recent history of pain in the abdomen, in cases of intussusception, with the passage of blood and mucus, will generally enable the diagnosis to be easily effected. The position of the tumour will vary according to the duration of the case; it is frequently in the left iliac fossa in hospital cases, and can often be felt from the rectum. It must be recollected that the intussusception is found, on examination, to be within the bowel, not outside. Some years ago I was called to see a boy, of ten years old, with a sausage-shaped tumour in the left iliac fossa and vague abdominal symptoms. It was said, "There is no doubt of the nature of the case, the intussusception has been felt per rectum." The condition was one of greatly distended ureter due to impaction of a small calculus at the lower end. A sausage-shaped tumour had been felt outside the bowel, not the soft bowel inside the rectum.

Tuberculous peritonitis may resemble chronic intussusception, but there will usually be more than one tumour found on examination of the abdomen.

Glandular enlargements of any size in the iliac fossa are usually secondary to disease elsewhere. Isolated tuberculous glands on the right side may be mistaken for a diseased appendix, when associated with abdominal complaint. The diagnosis between the two conditions may be difficult. Vague abdominal pains with a small elongated group of hard caseating glands, the size and shape of a small finger, led to a mistake in one instance, that of a boy.

The majority of swellings in the iliac fossa (right) are caused by inflammations of and around the appendix, and it is mainly in the diagnosis between these and new growths of other structures that difficulty arises. Sometimes the seat of the inflammation is in the cæcum, but for all practical purposes we may take it that the appendix is at fault.

It is not difficult to recognise the nature of most of the recent swellings in the right iliac fossa associated with continued fever, there is a history of an acute onset of abdominal pain with rise of temperature, and tenderness in the appendix region. But in the more chronic cases, with no abnormal temperature, there may be a difficulty, especially if the exudation marking the outline of the swelling is unusually firm and defined, or the swelling takes an unusual direction, and causes but little discomfort during its slow increase.

This is well exemplified by the case, amongst others, of a retired merchant of fifty, who was brought by Dr. Arthur Browne for swelling in the abdomen about which differing opinions had been given. About five weeks before, he had an attack of pain in the abdomen with vomiting. The pain was severe and in the right iliac fossa. For about three weeks, a definite swelling had been noticed, tender on pressure, and painful when moving about. He had not felt ill enough to keep altogether in bed, and he occasionally walked about the room. There was a hard swelling the size of a large fist with rounded outline on the right side of the abdomen, between the umbilicus and anterior superior spine, dull on percussion, very tender, but without fluctuation, and movable on the deeper parts. It came forward, and, at the outer margin of the rectus muscle, was adherent to the abdominal wall. The temperature was normal. About 18 months before, he had had an attack of pain in the right side of the abdomen, but it was not of long duration, and no swelling had been noticed. A diagnosis of appendix abscess of chronic nature was made, and in two days' time an incision was made into the adherent part of the swelling, and a little most offensive pus evacuated. Twelve days later the appendix was removed. It was very adherent to the abdominal wall under the site of the abscess. Its depth from the surface, owing to the stoutness of the patient, and its attachments, made removal difficult. It had passed forward to the front of the cæcum. On account of the softened state of the peritoneum and fasciæ which would not hold sutures, it was necessary to pass thick fish-gut stitches through the whole thickness of the abdominal wall. The appendix was about 3½ inches in length. Very thick walled and stiff. No concretion was present.

The swelling here was so very definite in outline, and apparently so very little adherent, that it closely resembled a malignant growth of the cæcum not involving the ileo-cæcal valve. (*See Lancet*, 1899, Vol. ii., p. 1277.) The previous history is very important in such cases.

There are two other conditions which must be mentioned, because they produce swellings in the iliac fossa, the first of these is hyperplastic tuberculosis of the cæcum. Here the tumour is somewhat the shape of the bowel, being more or less cylindrical, somewhat nodular and rather fixed; it may be tender. It is of slow development, and irregular abdominal pains merge into the symptoms of obstruction. This then is a disease which very closely simulates both new growth, and chronic appendicitis.[1] It preserves the normal contour of the bowel, is less nodular than carcinoma, whilst, in the case of new growth, the obstruction usually increases more rapidly. It is more sharply defined and less tender than the swelling of a perityphlitis, although frequently accompanied by pyrexia. Hyperplastic tuberculosis of the cæcum is a chronic disease, and at first it may present very little evidence of swelling; this may be found in the iliac fossa, or even above the iliac crest, but, as time advances, this becomes more evident, whilst the presence of tubercle in other parts may be found, especially in the lungs; no treatment other than excision is of any use.

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[1] *See* Kelly and Hurdon, p. 768. Hartmann: *Transac. Med. Soc. of London*, 1907, p. 349.

Tubercle of the appendix is very rare, usually only found on microscopical examination after removal, and forming part of a generalised tuberculosis of the peritoneum.

The second of the diseases referred to, which produces swelling in the iliac fossa, is actino-mycosis, which can only be suspected when the abdominal walls are rigid and board-like. There is a progressive increase in the swelling with a brawny infiltration of the tissues, followed by the formation of sinuses with purulent discharge in which granules of a yellow colour can be seen, which show clearly the nature of the case. These granules can sometimes be found in the stools. The prognosis is very grave, but the course of the disease may be prolonged by treatment, including the administration of iodide of potassium.

Carcinoma of the appendix gives rise to the same symptoms as inflammation of that part, occurs in young people, and is only recognised when sections have been examined with the microscope after removal. It does not produce a tumour, other than might be produced by a localised inflammatory thickening of the appendix.

If a growth of the bowel involves the ileo-cæcal valve, or by contraction causes mechanical obstruction of the bowels, in due course, then other symptoms are added which make the diagnosis easier. But let it be remembered that growths in this part of the body are not unlikely to become inflamed, before they have in any other manner drawn attention to their existence. (Or they may cause a real attack of appendicitis by obstructing the lumen of that structure.)

A most interesting example of inflammation of a growth without obstruction of the bowel, is the following case, in which a growth did not contract like the usual form of ring carcinoma of the large bowel, and therefore there were no symptoms of obstruction, although the tumour was a large one.

A married woman, aged 59, was sent under my care by Mr. J. Roalfe Cox, of Mortimer, on July 29, 1907.

The history of her illness was a short one. She said that she was quite well, so far as she knew, until two months ago, when there was a sore feeling in her right side; this did not trouble her much. Six weeks ago she had a violent pain in the right side, and was sent by another medical man to a hospital for "appendicitis." She was kept in bed for a few days, and then sent away, but, as she found a lump in the side on her return, she applied to Mr. Cox. She had been losing flesh since June. There were no other symptoms.

On admission she complained of a swelling in the side, which was not painful. On examination of the abdomen, distinct fulness of the right iliac fossa was seen, and a hard mass could be felt in the same situation with a roughened surface and fairly well-defined nodules at the inner edge. The borders were well defined excepting towards the iliac bone, which gave the feeling of extension of a rounded surface deep into the fossa. The swelling was practically immovable, measuring about 5½ inches in width; reaching to within ¾ inch to the middle line. Dulness over the growth was not absolute and was continuous with that of the liver. It did not move on deep inspiration.

The general condition of the patient was good. There were no signs of renal disease. Bowels regular and acting without medicine.

The diagnosis was that of malignant growth affecting the large bowel; but it was difficult to understand why the patient had had no symptoms of obstruction, for the growth was evidently a large one.

The tumour was removed on the 31st July, 1907, through an incision along the linea semilunaris. It extended downward from the lower margin of the right lobe of the liver to the iliac fossa. The tumour was adherent to the peritoneum of the anterior abdominal wall below, the under surface of the liver above, and the omentum in front. The omentum was ligatured and divided, the other adhesions separated above with the finger, and below with the knife. The growth was then separated from its other attachments, and removed after clamping of the small intestine below and the large beyond it. The end of the ileum was sutured into the side of the ascending colon after the free end of the latter had been closed.

The growth was hard, nodulated, completely surrounding the gut, and extended from 1½ inches above the ileo-cæcal valve for 4 inches, forming a hard, stiff open cylinder, with a lumen of about 2 inches in diameter. The interior presented a greyish-yellow ulceration with a raised edge. The section was very hard, and the cut surface grey and gelatinous in appearance. A few glands were removed with the growth, but there were not many to be felt.

Dr. Dudgeon reported that, on microscopical examination, the tumour was a colloid carcinoma.

She had an attack of thrombosis of the left calf during recovery, but was quite well and strong when seen in December, and had gained two stones in weight.

The inflammation of a growth may be the result of a breaking down of its structure, causing the formation of an abscess outside it, so that there is not only a new growth, but a localised suppuration of some extent. This must be recollected when we are confronted with a chronic iliac swelling, in people over forty years old, in which there is fluctuation. A very fair estimate may be formed by a few days' observation of the patient whilst kept in bed. Hyperplastic tuberculosis of the cæcum must be also remembered in cases like this.

A man, aged 56, was under my care some years ago, admitted for a large lump which extended from Poupart's ligament to a little above the level of the umbilicus, measuring about 6 inches each way. It was stated that the illness began ten weeks before, with pain in the situation of the lump, and had continued, sometimes dull and aching, at others of a sharp, stabbing character. He was quite unable to sleep at night. The bowels had acted regularly. He was losing flesh. Rigors, with high temperature, and increase in both pain and swelling, rendered incision of a fluctuating part necessary. A fæcal fistula followed rapidly, and in a fortnight he died from exhaustion.

A note was made that the swelling was very hard in places when he was admitted, and when the very offensive pus, found at the operation, had been excavated, it left a hard-walled irregular sloughy cavity, which did not diminish during after-treatment.

It would require more space than is now at our disposal to attempt to consider at all fully the inter-relationship between the right ovary and the appendix when diseased. The subject is large and complicated. It is not uncommon to find an ovarian cyst on the right side, when operating for the removal of the appendix, and the ovary and tubes should always be examined when such an operation is performed. In these cases, the ovarian cyst is not often accountable for the symptoms, it shows no sign of inflammation or suppuration. But when the appendix is adherent to an ovarian cyst and has caused infection of its contents; or when a similar cyst on the right side has become infected from other parts of the bowel, it may be impossible to say that the condition is not one of primary inflammation of the appendix itself, possibly going on to the formation of localised suppuration, for the appendix may form part of the swelling. An illustration of this type of case is as follows:—

A married lady, aged 41, was sent to me by Dr. J. E. Hinnel in February, 1907.

She had been married 17 years, and had had two children, and one miscarriage 8 years since.

She had complained of a great deal of pain in the lower abdomen, especially on the left side, for a period of four years, especially when out walking, and during the periods, which were quite regular.

In July, 1906, she had an attack of diarrhœa, following pain right across the lower abdomen, of greater severity than usual. Sickness lasted three days, and she was kept in bed for a week. Some swelling was said to have been present on the left side. Three weeks afterwards, she had another attack of pain and diarrhœa, and was kept to her bed for ten weeks. On this occasion, the pain was on the right side, which was very tender. The temperature rose to 101·2° for nearly the whole of the time. She was evidently very ill, for the medical man paid daily visits.

The abdomen was normal generally, but there was complaint of tenderness in the lower part to the right of the rectus muscle. At the position of greatest tenderness a rounded swelling could be felt. The uterus was rather fixed; nothing else abnormal was discovered.

At the operation on February 7, a multilocular ovarian cyst, the size of a cricket-ball, was found. It was adherent to the side of the pelvis and broad ligament, and had a shortened pedicle. The appendix was adherent to it, also a coil of small intestine. The former was divided and the stump turned in as usual. The small gut was separated, a denuded place in it being covered in with a peritoneal flap from the peritoneal aspect of the cyst. During removal the cyst emptied itself of very offensive pus and altered blood. The smell of this was so very fæcal in character that the large intestine in the pelvis was searched for a possible opening, but it was uninjured.

The main cyst wall was bound down by very firm adhesions, which required considerable force to separate them.

The soiled gauze packing was removed, and the area involved cleansed with sterilised saline. Fresh gauze was packed in the pelvis, and the other side examined. Another ovarian cyst the size of an egg but non-adherent, was found there, and removed.

Drainage by means of gauze and tube was employed.

The patient suffered much from shock, from which recovery was slow, and for a fortnight there was offensive discharge from the drainage opening; but, by the end of three weeks, she was quite able to return home, and has since continued well.

Should a communication form between a suppurating cyst and the interior of the bowel, it must, until removed, lead to exhaustive inflammatory attacks with pain and increasing weakness.

In 1904, Dr. Lee, of Kettering, sent a married woman, aged 28, who was suffering from a swelling in the right iliac fossa, to my care in St. Thomas's Hospital.

She stated that she had always been delicate, and had been treated for anæmia between the ages of 17 and 24. She had always been irregular as regards the periods, but there had been nothing else remarkable. During her married life she had been pregnant three times; the first two pregnancies terminated at seven months, the child being still-born. The third ended at the eighth month, and the child lived nine days. No special difficulty was noted at any of these confinements, but after the last, in April 1903, she had severe pain in the lower part of the abdomen, and was in bed for five months. During this time she had several feverish attacks, the first being a fortnight after delivery. During this period, she had numerous shivering fits, at intervals of about a fortnight.

In September, 1903, she was removed to the Kettering Hospital, and an exploratory incision made over the appendix region, where there was a swelling. A large tumour was found growing up from the pelvis, and very adherent. No attempt to remove it was considered justifiable, the appliances of the hospital being inadequate.

She was discharged better for her stay, but before the end of December had to take to her bed again with severe pain in the right groin and right iliac region. She was at this time very constipated, but there was no vomiting. Since Christmas, 1903, she has had many recurring attacks of pain of a similar kind, three of them being of exceptional severity.

On admission, the abdominal wall moved well and equally on the two sides. There was an oblique scar over the right iliac region. A rounded tumour, which apparently came from the pelvis, could be felt in this part, and the hand could not feel its lower limit. It filled up the right iliac fossa and extended about 2 inches beyond the middle line of the body. The upper limit was about ½ inch below the umbilicus. It felt cystic, and was tender on manipulation, especially towards the right, which was markedly dull on percussion. Examination per vaginam showed the uterus to be high and rather fixed. Nothing else abnormal was found. The urine contained a faint trace of albumen, Sp. 1020. Temp. 99° p.m.

Operation was performed on March 18, 1904, through a median incision. When the peritoneum was opened, a large dark blue thin-walled cyst presented itself. After the area of operation had been surrounded with sterilised gauze, this cyst was punctured with a trochar and cannula, and about half a pint of thin yellowish fluid escaped. The main swelling being multilocular, the contents of two or three other cysts were evacuated through the same puncture. The whole tumour sprang from the right ovary. The operation was rendered extremely difficult owing to the dense adhesions round the cyst, and about the scar of the previous operation. A loop of small intestine was firmly adherent above. After separation, the adherent part was invaginated partly to stop oozing, and partly to diminish the tendency of the raw surface to adhere to other parts. Firm adhesions to the fundus of the uterus were then divided, and some ligatures applied. The anterior surface of the growth was also very adherent along the line of Poupart's ligament. On the outer side the cyst was attached to the lower end of the cæcum, there being no less than three openings between it and the interior of the bowel. A separation having been effected, the openings were thrown into one, excess of tissue cut off with scissors, and three superimposed rows of silk (continuous) suture inserted. Drainage was employed.

The operation, which lasted about 1¼ hours, was followed by moderate shock, relieved by a subcutaneous injection of Liq. Strychnine ♏v.

The plugs were removed on March 20. The glass tube replaced by a rubber one on the 21st, and this removed on the 29th. Some vomiting persisted for two to three days, and then passed off, but suppuration to a limited extent lasted for the next ten days.

Ultimately she left the hospital on May 14, having quite recovered. Some months later she returned with a stitch sinus, but was otherwise well, and, when this sinus healed, her health was good. She had been able to resume her household duties on her return home after the operation.

In mentioning the swellings, of which these two cases are examples, I am perhaps going outside the strict limits which I intended to keep when I commenced, but they illustrate a most important group, one which can hardly be excluded from our consideration when they have become infected and, secondarily, adherent in the situation of the appendix itself. These adherent and infected growths must be removed, and the sooner their removal is undertaken the better for the patient; do not let them wait until repeated attacks, with the accompanying fever, have induced a state of anæmia and exhaustion, making an operation of any kind unnecessarily hazardous.

HOW TO SECURE MENTAL HEALTH AND HOW TO PREVENT MENTAL BREAKDOWN.

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IN dealing with mental processes, it is necessary to have an elementary knowledge of psychology, for we are thus enabled to analyse any actual or concrete mental experience into its simple components, and to discover, by this analysis, how they combine, and by what special laws. We are thus able to bring them into connection with physiological and bodily conditions.

In the following remarks, we shall frequently direct our attention to the term "mind," and it may be well to know that the word is variously used. Generally it is understood as an antithesis to matter, and formerly the term implied something really outside nature, which yet showed its power and design in the creation and ordering of nature. This old anthropomorphic view gave way to pure idealism, and mind was later viewed as something transcendent, which was partly immanent in nature, and also partly apart from it, the ultimate reality being spiritual or mental. Thought and soul and spirit were interchangeably used for mind; but spirit is looked upon, more especially by theological writers, as something higher than soul: it is even looked upon as a second soul, dealing with intuitive, ethical, and religious faculties. It is well for us who are psychologists, to view this subject from the practical aspect, and to discard all philosophic notions, fascinating as the cogitation and meditation over abstract ideas may be, and pleasurable as are the airy flights of the imagination, and interesting as are intellectual gymnastics furnished by the contemplation of unrealities. In their final investigation, theories in regard to spiritualism and materialism, dualism and monism are beyond the scope of physiology and psychology, and are really a search "by a blind man for a black hat in a dark room," the hat in question not being there.

Mind, therefore, is to us not an entity, not a substantial something, like a table or a chair, upon which mental processes rest, or behind mental processes, and underlying their manifestations. To us, mind is the sum total of mental processes—*i.e.*, ideas, feelings, and impulses experienced during a lifetime—and we shall apply the term "consciousness" to the sum of mental processes at any particular moment of time, such as, for instance, NOW. We have no proof—although there are some, probably many, who believe it—that there is some permanent unity behind all the phenomena of mind, some active or directive principle by which mental processes are originated and regulated. There is no evidence from an examination of our own minds that there is any such activity, or any such single active united body, that can account for our consciousness. Apart from this self-examination or introspection, *i.e.*, analysing, noting, and describing our own mind in its various phases—and watching the changes in the emotions, memories, and mental associations in ourselves—we have no means of gauging the mind other than through bodily manifestations. We watch for movements of the face, hands, or body in others, and, knowing how, by introspection, we ourselves felt under the exercise of similar conditions, we infer that others undergo like mental states with ourselves, and we infer this or that thought from this or that action, because we know, from experience in ourselves, that, when we act in a particular way, certain thoughts or feelings invariably accompany or precede these actions, and we are thus able to discover and appreciate in others the sense of pain and pleasure, the emotions of anger, hatred, disgust, love, or fear. We believe we are therefore justified in stating that every mental process has, as its necessary condition, a bodily process, *i.e.*, some change which occurs in the central nervous system, and more particularly in the cerebral cortex.

Physiology and pathology, as well as psychology, support the statement that the brain is the organ of the mind, so that there is no mental state which has not a special nervous state, corresponding with it or correlated with it, in the living body. We know that disorder of the brain through disease can and does affect consciousness in a variety of ways, and may even permanently impair the action of the mind. We further know that certain drugs, such as opium, chloroform, alcohol, and many others, affect the brain, and, at the same time, cause derangement of mind.

Mental integrity depends upon the healthy state of the delicate structure of the brain, and this structure is further dependent upon a proper flow of healthy blood through the brain-tissue. If the quality of the blood is altered from whatever cause—and possibly alcohol is the commonest—or the flow of blood is interfered with in any way, then unconsciousness may result, as we see in fainting through loss of blood, or from sudden failure of the heart's action, or from a violent blow on the head, all of which either alter the relation of the delicate nerve-cells and fibrils to each other, or vary the circulation of the blood within the brain.

The bodily processes explain the corresponding mental processes, because they are the conditions under which the mental processes occur; but bodily states cannot be said to *cause* mental states, and the brain cannot be looked upon as secreting mental processes in the manner that the liver, for instance, secretes bile; nor, on the other hand, can we state that mental states *cause* bodily conditions. Mental processes are facts of one kind, and bodily processes facts of quite another kind. How these are related is unknown to us, all we do know is that they are interdependent, and we are compelled to summarise our understanding of this relationship as a parallelism, usually described as a psycho-physical parallelism—which, after all, is only a statement of fact, and not an explanation of the phenomenon. That the brain is the organ of the mind is, therefore, of universal acknowledgment, but it is also quite as much the organ of the body, for it is through the nervous system that man feels, and moves, eats, breathes, and has his being. The activities of the body are under its control: assimilation—in the physiological sense—secretion and excretion, the nutrition of living tissues, the production of heat, the regulation of the bodily temperature, and the liberation of energy which characterise life. All these are functions which are more or less under the direct control of the nervous system; hence its paramount importance as the highest and most complex tissue of the body.

Now, as to the peculiarities or essential qualities of this master-tissue, the nervous system. It is the most vascular, *i.e.*, the best supplied with blood, of all the organs in the body. It consists of many millions of nerve-cells or "neurons," with their conducting fibrils, which are supported by branching, interlacing, delicate, and fine material network. All impressions reaching it, and these are incessant, are conveyed along highly conductile strands from some more distant receiving apparatus adapted for the particular sensation, *e.g.*, the eye, the ear, the nose (for smell), the tongue and palate (for taste), and the skin (for touch and common sensation). Hence it is important, for proper brain and mental reaction, that correct impressions should be received through the various senses; and the early discovery of sight troubles, throat, and ear diseases, etc., in children may prevent mental defects or backwardmindedness.

The brain depends for its integrity upon the combined and co-ordinated healthy action of all the other organs:—the bones should be well set and well grown, because the marrow of the bones is one of the sources of the red and white blood corpuscles, moreover the bones of persons mentally afflicted become weak and easily broken; the musculature should be well developed, not only in order that the stature and the physical development should be of normal build, but also because the muscles play a prominent part in the metabolism of the body, and muscular activity accelerates the circulation and promotes well being; the glands of secretion and excretion should be active, and the physiological processes of respiration should be normally kept by suitable general exercises, and by systematic exercises in breathing, singing, and speaking; the digestion should be cared for by taking food at regular times and in moderate quantities; the circulation and assimilation should also be normal, so that the nutrition of the body, and the building of the tissues, might be properly carried out.

There are continually flowing into the brain sensations, such as those of heat and cold, those from the muscles and joints giving rise to sensations of pressure and to the sense of equilibrium or the proper balance of the body, also many sensations connected with the inner vital organs, which are always being conveyed into the brain, where they give rise to ideas, or states of consciousness, always flowing in a perpetual stream.

These various perceptions and ideas are then elaborated, considered, and studied, subsequently tending to outward action, and being always associated with either comfort or discomfort, *e.g.*, pleasure or pain: so that our actions are the result of our thoughts guided by our feelings, and, whatever our thoughts may be, these tend, with certain feeling tones, to arouse in us corresponding trains of suggested action, *i.e.*, every thought has a motor equivalent, and, *vice versâ*, every mental act has a motor side. We know, when overlooking a chasm or a beetling cliff, that an effort of will has to be used to prevent precipitation, the idea of falling getting into action, and the motor equivalent of the idea tends to be realised. The same also, when one is standing on a railway platform along which a train is rushing by at 60 miles an hour, the idea of the moving train suggests the same rapid movement of the body, and an effort has to be made to prevent its being carried into effect.

From the fact that thoughts suggest action, and that the growth of the will, or the power of inhibition, is of later development than the formation of ideas, we should realise the strength of temptation to young people, who are creatures of the senses. The sight of cakes and sweets to a schoolboy immediately suggests the appropriate action: hence the great importance of example, rather than precept, when bringing up children—a matter which concerns not only parents and pedagogues, but also all who occupy public positions, or who are interested in public morals. It is not denied that actions are originally spontaneous and early, but purposive ends are of later growth, a successful acquisition being accompanied with a pleasurable sensation. There are many actions which do not arise from, and are not due to thought, but result from *instinct*, and in regard to which something will be said later. It is without doubt that the thinking part of mind depends upon experience, or what comes into the mind through the avenues of the senses, as described above, and it is quite clear that our knowledge, our beliefs, and our opinions, must be dependent, and be largely based, upon the supply of material from the senses; the mind making up its thoughts from the supply brought into it through the senses. It is impossible for the mind to express thoughts, in regard to which experience has not provided material, and, upon this assumption, persons born blind can have no delusions of sight, nor can those born deaf have aural hallucinations—which are facts recognised by every mental physician.

The paramount importance of education is readily appreciated from these facts, especial care being exercised to place only that material before the young which can be utilised and be of future service in training the mind, and in the formation of character; hence the two great questions of *health* and *education* are most important factors in the success of the individual as well as in that of a nation. Education and mental growth depend upon one special and peculiar character of nervous substance, viz., the power to receive and to hold impressions, a power by which mind retains the material it receives, due we may suppose to a molecular change in the nerve-cells or "neurones," and persisting for a longer or shorter time, depending—as Bain teaches—upon the intensity of the particular stimulus or experience, upon the innate plasticity or retentiveness of the individual who receives the impressions, and also upon repetition as the inattentive pupil well knows. This power of fixing, retaining, and recalling events, which we call *memory*, varies much in different individuals, and the cerebral cortex is described as "wax to receive and marble to retain." An impression once made is indelible. Hence the importance, in early childhood, of imprinting upon the mind impressions which are favourable for good future social surroundings, education, and culture, and which leave indelible imprints that, once ingrained, shall never be eradicated. The memory, as a faculty, is greatly affected, and may even be completely impaired, or destroyed, in some cases of mental disorder.

Another process in the growth of mind is the *association of ideas*, whereby certain mental materials tend to come up together; certain things, which have been perceived and recognised through the senses, tend to come up again in the future in like combination. Certain clothes, for instance, are associated with certain days of the week, or portions of days. We have our day frocks and our evening dresses. We have the distinctive garbs of professions and employments, which are immediately associated with the occasion or the *status* of the person wearing them. There are also certain emblems associated with certain rites and certain performances—holly leaves are associated with Christmas, shamrock with St. Patrick's Day, the leek perhaps with St. David's; certain flowers are linked in the mind with certain persons who wear them, etc., so that by "association" certain ideas, which come into the mind, tend to be grouped together, and when one is presented the other arises as it were unconsciously.

A further subdivision of mind is into what is described as "*assimilation*," which enables us to compare new experience with old, as when a scene or a picture immediately recalls a familiar and similar landscape, or the likeness to a friend seen in the face of a stranger. Another quality of mind is "*apperception*" or the focussing or combining power, which is a peculiar and special activity of the whole mind, classifying what it receives, sorting out similarities into larger and more definite combinations and higher degrees of perplexity, these being then known as notions, or concepts, or general ideas.

There is one attribute of the mind, which is especially worthy of consideration, viz., the will, which is "acting upon a motive." When motives for conduct are clear, and we are able to deliberate upon them, acting after due reflection, they give a sense to the mind that the action springs from our own choice, hence the vexed term "freedom of the will;" but no action ever occurs without the appropriate thought to suggest it, hence again the necessity for suggesting good motives in the upbringing of children.

We have dealt at some length with the origin of "mind," because it is "mind" that has discovered the Laws of Nature. Mind has advanced the progress of science, evolved the method by which man has used the forces of Nature for his own service, organised human institutions, established order and government, and made it possible for men to live together, as they do, united in common action, and in a safe community.

It is a maxim, and certainly an economic one, that there is no wealth but life, which is the dearest possession; that gold is not wealth, and should only be used for the purchase of life, and that the preservation of the health of a nation is its greatest asset, for health can bring wealth; and that nation is the strongest which has the greatest number of healthy citizens, whose minds and bodies have been so educated and trained that they can render it strong and undivided service. We shall refer later, in some detail, to the necessary hygiene of mind and body, with the object of fulfilling one part of our text, viz., "how to prevent mental breakdown."

Let us briefly consider the departures from normal healthy mental action, as when a presentation is made to the mind, but by an error in "assimilation" such a presentation is falsely interpreted.

If this inaccurate perception is believed in, the mind being unable to correctly compare a past experience with the present, an impression will appear in consciousness very different from the actual fact. Such a false interpretation is an "illusion," but if it arises from within, and is quite independent of outward objects, then it constitutes a "hallucination." The tolling of a bell, which is believed to be the sound of the human voice, is a false interpretation, an inaccurate perception, or an "illusion;" but when no sound is audible, and human voices are still declared to be heard, then there is a perception without an object, or a "hallucination."

When the mind acts upon such false beliefs, and there is inability by the evidence of the senses to realise the falsity of such a belief, then there is a delusion; and these abnormalities may constitute insanity, although there are many persons, suffering from the presence of delusions, who are yet not insane.

Illusions of sight occur to quite normal individuals, the folds of a curtain in semi-darkness are often interpreted to be more or less fantastic shapes. Luther beheld the Devil in person, and Dr. Johnson used to hear his mother calling Sam from Lichfield, although he himself was at Pembroke College, Oxford. Sir Walter Scott saw the ghost of Byron. Goethe had seen an exact counterpart of himself, and Macbeth saw the dagger of his imagination as distinctly as the dagger he held in his hand, whilst Descartes had the hallucination that he was being followed by an invisible person urging him to pursue his search for truth. Joan of Arc, Peter the Great, and Warren Hastings are examples of distinguished persons who laboured under the influence of delusions, and there are many other instances of those who manage not only their own affairs, but also the affairs of others, with conspicuous ability, yet who are the victims of delusions.

The insane mind acts in precisely the same manner upon motives as does that of the sane person, and although conclusions may be correctly and logically deducted, yet the conclusions are from false premisses, the person not being able, by any evidence presented to the contrary, to appreciate the falseness of these premisses. So long as conduct remains normal and unaltered, or does not exceed what the particular social surroundings deem to be within the normal, and so long as there is no interference with his own liberty, or with the liberty, or safety, or property of others, the individual so affected may remain a free person ; but the moment the conduct is such that society around refuses to tolerate it, then freedom is curtailed, and segregation takes place, until proof is again afforded of the fitness of this person to be at large.

This necessity for segregation is an important consideration to the community, and is, moreover, a serious burden upon society, seeing that its support and maintenance devolve upon the prudent and thrifty, those who already in other ways contribute to the prosperity, the stability, and the security of the country.

Such forms of alienation as come under notice for segregation constitute some of the many varieties of insanity, but there are other mental defectives, who fail to reach a normal development through arrest, caused by ancestral defects, for which the offspring suffers.

Those, through arrest or deficiency, constitute the varieties described as idiocy and imbecility or defectives, and it is estimated that, in London alone, there is one such case to every 100 children among the 760,000 children who are upon the roll as of school age.

Such mental infirmity varies from a slight defect—for which the Epileptic and Defectives Act, 1899, provides accommodation—up to complete arrest of intellectual development. Nor are these all, for the Blind and Deaf Act of 1893 secures accommodation for a further class of defectives, and there are in addition those who are unduly precocious, or are perverted in some way, and who become the inmates of asylums, prisons, and workhouses. Perversion of normal *instincts* are frequent in insanity, and by *instincts* we mean those relatively complex and inherited faculties, which are aptly illustrated in the preservation of self, *e.g.*, the search for adequate food, clothing, warmth, and comfort, also others exemplified in maternal attentions to the young. The reversion or perversion of normal instincts is witnessed by attempts at suicide, the destruction of offspring, and by the refusal of food—symptoms which constitute insanity.

There are probably 125,000 insane persons and detectives, who are incarcerated in the various institutions of England and

Wales, and there are others, such as inebriates and criminals, who have to be supported, many of them, for the term of their natural life. Moreover, there are those who are not criminals, but who are degenerates, and who eventually become dangerous members of society, those who are derelicts, "misfits," unsuccessful competitors strewn along the path of progress, groups of persons enfeebled and deteriorated who grow up to become the inhabitants of reformatories, receptacles for the insane, and poor-houses. These constitute a great and terrible social evil, and it is not too much to say that a part of this evil is both preventable, and to a great extent remediable.

Having detailed the *mechanism* of mind and its alienation, let us now attempt to consolidate the various faculties acknowledged, and which this mechanism implies, into one continuous whole, into the mind, let us say, of an average boy or girl, whose future is expected to play a part in the citizenship of the world.

I am of opinion that teachers often fail to grasp and to convey the full value of instruction because of their ignorance, or disregard, of elementary psychology. Teachers too frequently use the word "Don't." "Don't say don't," is a pedagogic maxim too often overlooked and disregarded. Such negative training fixes the attention upon the contrary idea, and an idea immediately tends, as pointed out, to become action, and the contrary suggestion is thus carried out.

The child should be taught to do something rather than nothing, for the will *not* to do is more difficult to cultivate, and comes later, than the will to do. The growth of the "will" is a most important development of child-character. The power to deliberate, and to say "No," is of late appearance, and implies a certain power of inhibition. It is really the distinctive difference between man and the lower animals.

Possibly the earliest appearance of the will is the power to fix the attention, which naturally seems to be the first act of the will. It is during early education by the teacher that the foundation of character is laid: probably, if a period is fixed, it is during the first seven years of life; the character being formed during the next seven, and consolidated during the third seven, viz., between the ages of 14 and 21, and what is laid becomes too fixed and firm to be capable of reform after the age of 21 years; hence the recidivists among drunkards and criminals, who repeatedly come under treatment, being sent to prisons and institutions with the object of reformation!

Children bear the scars of moral injury all their lives, and I have lived too long to believe in the complete reformation of character after full maturity, although I do not doubt the authenticity of exceptions; but the groundwork for the healthy mental life must be prepared and laid in early childhood.

I cannot help thinking that our system of education, hitherto, has not been of the best type for the moulding of character so that children may develop into good and useful citizens. Teachers have been too much concerned with imparting knowledge, as if to pour knowledge into the mind was to educate, and there has been more concern with the knowledge to be taught than with the individual to be educated. Too little attention has been paid in the past to the development and formation of character, to discipline, to obedience, and to conduct. True education consists in the full development of all the powers of the individual, and is concerned with the growth of healthy instincts and tendencies. Reverence for authority has been, we may say, almost totally disregarded, except possibly the personal authority of the teacher, and the catechismal injunction to honour and obey, to submit and to order one's conduct has been relegated to the category of abandoned superstitions, much to the detriment, not only of children's welfare, but also of that of the general community. I do not think, in these days of equality, that we have adequate compensation for such a purposeful omission. There can be no perfect manhood unless there has previously been a perfect childhood, and it is no derogation to the social status of the poor man's child to teach him to speak in a kind, respectful, and submissive manner.

Witness, in regard to the growth of the will, the gradual development from perception into action, and the pleasure associated with activity, the spontaneity of early childhood. See how vivacious, active, and restless are the movements of little children, and how much pleasure is associated with such voluntary movement. Pleasure enters largely into the various acquisitions through movement; and, with suitable companionship, the open-air playgrounds afford the best training ground for the development, as well as for the subjection, of the "will." This is the golden opportunity for the proper evolution of will power, and is especially favourable to the cause of orderliness, method, and obedience. For my own part, I am exceedingly gratified at the compulsory medical inspection of school children, for I think it will be the opportunity to organise games and recreation on a more thoughtful scale, and to develop children's playtime along scientific lines, because much of the work of anthropometry to be shortly initiated, and to be carried out, will be through the games which teachers and instructors will consequently watch and take an interest in, as the result of properly directed scientific exercises and gymnastics.

Games awaken social instincts, and help to establish moral relations, such as loyalty to a code of honour; they exercise the senses and train the muscles in harmonious movements, they teach the child to obey as well as to rule, and they also inculcate principles of truth, fair play, and justice. Even simple marching to music is an agent for teaching order, rhythm, number, and relationship. Weakly children often freely develop with gentle and well-considered muscular exercises in a gymnasium, when natural games are impossible. The recent evening opening of playgrounds, formerly closed except during school hours, must prove to be an immense addition to the happiness and pleasure of children, especially in the more densely populated districts, where the only open-air space is the dreary street, the alley, or slum, which alone was previously open to them. In my opinion, you cannot give children too much happiness, too much of their mother's love, for it is through the pleasure of happiness that the best mental discipline is obtained in early life. It is the pleasant, emotional feeling of personal affection and social regard that helps so much to create the sense of harmony with the surroundings, which afterwards develop into happy family life and filial love.

Again, the pleasure afforded to children in schools by Nature study is acknowledged to be the means of opening out quite fresh ideas in regard to imparting knowledge to the young, and Nature study is educative, for it opens out the mental faculties by exercising the powers of observation, and it creates fresh sympathies and widens human instincts. There is no doubt that the science of education is to arouse interest, and to satisfy the natural curiosity which is inborn in every child. Through the knowledge thus obtained, the mind is developed so that it can apprehend new situations, and adapt itself thereto. The experience of emigration societies and colonists in regard to the mental awakening of town children illustrates this, and the statistics of Mrs. Close and her well-known scheme prove that even ill-grown town children can develop into resourceful, adaptive, energetic, active, temperate, and capable citizens.

My sympathies are keenly aroused for the 65,000 children under the Poor Law, of whom 35,000 are in institutions, and 22,000 in the different workhouses; where they cannot but be mentally contaminated, and morally debased through compulsory association with the lowest characters: where also they are without a glimpse of home-life, with no knowledge of natural surroundings. I trust this may be radically dealt with in the forthcoming Report of the Royal Commissions on the Feeble Minded and on the Poor Law.

The question of religious instruction is now dangerous ground for the uninitiated, and, under the present rule, it appears to be "taboo." Nevertheless, spiritual agencies do kindle a spirit of fervour, sympathy, and right-mindedness even among the roughest characters, and in the most crowded areas of our cities. Possibly there may have been intolerance and excessive zeal in the advocacy of religious dogmas upon unwilling minds in the past, but true religion is a service and should be so taught. It urges one to think of others, and to cultivate high ideals, not only for the family, but also for one's country. We sing of our country's heroes, and we read the lives of great and good citizens in order to influence our own and our children's lives, yet there are those who will not tolerate ideas of patriotism for the young! There is no shame in being proud of the country to which we belong, and which is our own Fatherland. Such thoughts give inspiration to respect order, and to obey the laws—essential qualities for good citizenship. Some persons appear to think it is a sin to commemorate "Empire Day." It is "jingoism," "militarism" and savours of "aggression." Surely on such a day we can all think and talk of the good home-life of our country's people, and such sentiments help to teach young people the love of home, and that all should try to become good people, good women, good men, and good workmen, for these are the physical and moral backbone, and the true support of the country.

The questions of religion and morality are, in my opinion, not separate. The spirit of love and reverence towards God, towards parents, towards women, is native to every child, and the teacher, who believes in his religion, is capable, through religious teaching above all others, of drawing out what is best and noblest in his pupils, and it is not too much to say that the teacher who does this consecrates himself, or herself, to the highest human interests. In order to teach morality, it is essential that conduct should be early inculcated by good examples, so that the child may see and copy them. Children should be taught to avoid bad companions, and to choose only those who can raise them up to be honest and truthful, never to break a promise, to show kindness to others, to be gentle with those weaker than themselves, to respect the aged, to be bright, cheerful, and good tempered rather than discontented and grumbling: such training forms the essence of self-control.

The "dignity" of labour is an attribute of character too often left out in training the young. The hand and mind were made for work, which is the law of life, and the fuller and more active the life is the more perfect it is. It should be the purpose and pleasure of life to work with zeal and enthusiasm; for earnestness carries conviction to others, and work done with thoroughness leads to success. In regard to this something must be said of prudence and thrift; that effort to save for a rainy day, which in order to be effective must be learnt and practised when young. Such a saving often alleviates the lot of the sick, and their families; for it helps to lessen the number of sick days, and thus limits the interruption to work and earnings occasioned by sickness. The large sums, contributed towards the benefits conferred by the friendly societies, show that it should not have been beyond the "wit of man" to devise a contributory scheme of old age pensions which, once started, would have been greatly appreciated.

The value of a "clean life" cannot be overrated, and in this are included temperance, chastity, and cleanliness, which are the foundation of self-respect, as the body should be kept pure, and the mind interested. The mind must have occupation, for lack of interest, and idleness lead to sensuous gratification of all kinds, one of the most powerful decoys being strong drink, and there is no more subtle poison to the growing mind and body than alcohol—which deadens morality, and tends to lower the resistance to disease.

It directly favours the "white plague" tuberculosis, and it is fatal to individual prosperity as well as to national progress, being the most potent factor of inefficiency. It is most gratifying to know that two of the Bills now before Parliament, one of which has already passed the Committee stage, tend to limit the use of alcohol, and of tobacco by the young.

If the moral habits already commended, and cited *seriatim*, are early inculcated—and they are not copy-book headings but sterling advice—they will tend to become second nature, and to be the best preparation for a successful and prosperous life.

It may be retorted that the world has known of these counsels of perfection from time immemorial, and that, in spite of their being preached from pulpit and platform, from books and papers, from the highways and by-ways, the state of society is really no better to-day than it was half a century or more ago. Such a retort is neither correct nor true, but yet much remains to be done, for, in a state of society where, according to Charles Booth, over one-third (30·7 per cent.) of the population of London is on or below the poverty line, and over 30,000 have no home but the common lodging house, where shelters and "doss houses" are crammed nightly, and yet hundreds are still crowded out, or have not even the one penny necessary for the privilege of a shelter; where, again, 1 in every 250 persons is insane; 1 in every 40 is on the rates; 250,000 convictions occur in one year, with a steady increase of juvenile delinquents; when 1 in every 3 persons dies in London every year in a hospital, workhouse, or lunatic asylum, some reconstruction of society appears to be urgently necessary!

Contrast this picture with another. In 1905–6, the National

Income reached £1,750,000,000, and the gross assessment for Income Tax was £925,184,556. One-seventieth part of the population own more than one-half the entire accumulated wealth of the United Kingdom, and more than half the area of this country is owned by 2,500 people, and, even of this small number, only 69 persons in a 1,000 leave £300 behind them, whilst only 97 per 1,000 leave anything worth mentioning at all.

This awful disparity between wealth and poverty, between affluence and abject want, the acute contrast between luxury and wretchedness, appear to be so striking that I welcome the *intellectual restlessness* and the *unrest* among the thinking classes caused by Socialism, although I may have little sympathy with the *means* advocated and employed to attain the desired end.

The portentous fact that an increase of insanity invariably attends the march of civilisation is sufficient to give us pause; but the evolution of the many must proceed at the expense of those who are physically, mentally, and morally incapable of elevation, and the path of progress must be strewn with human wreckage. Such a lesson only too clearly demonstrates that the highest forms of self-control are essential to success, and that Nature's warning may only be disregarded at our peril. It is significant, however, that each one of us, in his or her own way, is capable of assisting, to a higher plane of growth, the development and culture of the mind and body of man, as well as that of his moral nature.

I do not believe we are living in more selfish or brutal times than heretofore; facts disprove this, for there never has been an age when so much was given in charity or philanthropy, or to assist education as is the case to-day. Witness the Rhodes' munificence, and more recently that of Wills of Bristol, of Lord Kelvin in Glasgow, and of Pearce for Trinity College, Cambridge, and of many others. Witness the response to the appeal for Hospitals in London, and particularly that of the ex-Lord Mayor on behalf of Cripples, and the gifts of millionaires in this country and America.

I do not, speaking as the man in the street, feel that the solution of misery and unhappiness is to be found in the reconstruction or reorganisation of the means of production, distribution, and exchange. On the other hand, I believe there never has been a more pressing need for voicing, in no uncertain tone, the necessity for individual effort and aims, and the realisation that every person has a definite responsibility of his own. I also think that much of the misery and inequality of life to-day may be directly traced to conditions of personal health, and the fact that public opinion is beginning to call for an improved hygiene, and for a more careful supervision over personal sanitation, is an indication that the preservation and promotion of the health of the people are becoming urgent and pressing State questions, and in regard to which the appointment of a special Minister of Health may soon be realised. Man's health must be his most precious possession, the loss of it is productive of injury, not merely to the individual, but also to his family and to those dependent upon him, who are thus compelled to suffer anxiety and poverty. It is likewise a loss to the community, for, through sickness, a man loses his power of work, and his ability to earn a livelihood, quite apart from missing, through ill-health, the chief pleasures of life. The restoration of health, moreover, means incurring expense, and the fact of suffering illness, if this is of an infective nature, becomes a positive danger to others. The need therefore for fresh air in the place of the used-up and vitiated atmosphere of crowded and ill-ventilated dwellings, and the need for sunlight and for cleanliness are self-evident. A clean skin, which, by gradual "hardening" through the stimulus of a cold bath, can be made capable of enduring changes of temperature without discomfort, is essential to health, for fluctuations of temperature give rise not only to discomfort but also to chills, or catarrh, to rheumatism, neuralgia, inflamed throats, and pneumonia, together with a host of other ailments too numerous, and too diversified, to catalogue. Attention to the teeth, night and morning, and not once a week, as was the boast of a recent convert, not only keeps them clean but also preserves them, for upon the teeth greatly depends the healthy state of the whole body. The teeth of the insane are proverbially bad, even if they have any left. Attention to the eyes, by cleanliness—which prevents various inflammatory affections of the lids, conjunctiva, and cornea—and by care, in regard to the amount and direction of the light, tends to preserve the sight from overstrain. Attention to the ears, the nails, and the hair is necessary, for dirt brings disease.

The care of the muscular apparatus, and of the respiratory organs by regular exercise is also necessary, as already suggested. The care of the circulatory organs and digestion (the latter being the most used and most abused section of the human body) by proper feeding, the avoidance of over-eating and drinking, and the abuse of alcohol, by observing that the food is always simple and wholesome—and here the questions of a pure milk supply and of the adulteration of food come out in bold relief—by care to select food suitable to the manner of life, and, above all, by attention that it is properly masticated to permit of access to it of the various digestive juices, and by care that the food is sufficient in quantity, is essential. Food should be taken slowly, and at proper and regular intervals. Attentions such as these help the idea of being strong, which children like, and tend to the promotion of a healthy growth of the tissues, and to the preservation of good health, and by such is implied the prolongation of the power to labour, and of man's life in general, and also in a great measure the prevention, restriction, and removal of sickness and disease.

It will be noted from what has been already said that the duties of the medical man must become an important business of the State, and it is right that the State should not only pay for their proper performance, but organise them into one great and special department, so as to prevent diffusion and overlapping.

It may be suggested that we have dealt at sufficient length with man's health and physical growth, and that, as we have referred in some detail to his moral development also, a word might now be appropriately said upon the purely æsthetic aspect of his mental life. Of all the pleasures which can refresh the mind, probably there is none more invigorating and strengthening than reading, which is to the mind what exercise is to the body, viz., the best preservative of its vigour and growth. Reading is the most soothing remedy for many of the ills of the body, and the position of the librarian to a mental hospital or to an asylum is one of the most pleasure-yielding posts—if there is adequate literature to circulate, as there should be. Even the solitary and the unsocial among the inmates are not averse from fraternising with some of the characters who have adorned literature, among whom may be ound friends to love and idols to worship.

It is chiefly through books that most of us have enjoyed intercourse with great minds, and, no matter how poor a person may be, there is the charm that the best characters never refuse to cross his threshold, so that he may be elevated by their intellectual companionship.

For young people a taste for wholesome reading—one that can be acquired by all—is the best counteracting agency to unworthy temptations. Good reading may equally be the diversion of young and old, rich and poor, the ill and well.

Darwin expressed the regret that he had not devoted more time to poetry as an intellectual diversion, so that he might relax his logical faculty by an exercise of the imagination, and thus familiarise himself with the language of the heart rather than that of the head. There is great consolation to most young persons in the reading of poetry, which is musical thought; while in music there is another mental calmative as well as a direct stimulant. The power of music upon the mind is widely known, and the Society of St. Cecilia, founded some years ago, based its ethics upon the purifying influence of music upon our emotional nature. It charms away care, anger, and terror, removes all that is selfish and ignoble, delights the ear, soothes the nerves, composes the thoughts, dispels morbid ideas, and recreates the mind. It is, according to Carlyle, "the inarticulate speech which lets us for a moment gaze into the Infinite." Every mental physician makes use of music as one of his remedial measures. Painting and pictures, as branches of æsthetic art, have also their due place in the relief of mental disorders, and a room hung with pictures is, as Sir Joshua Reynolds said, a room hung with thoughts. Pictures are consolers of loneliness, and form an ideal relief to the jaded mind. How often do we see the sick in mind gaze upon illustrations in books, or upon prints upon the wall, and thus obtain representations of healthy ideas, where natural scenes and spheres help the normal faculties to re-establish their superiority, and thus direct the thoughts once more into healthy channels. Unlike a book, they can be gazed upon without sustained effort, and, when the eye is fatigued, the mind can relax its attention. How many of us have put in a spare half-hour at the National Gallery, and refreshed our thoughts with the inspiring genius of some great painter until we think we understand and love him, for a great picture is a great moral lesson! Art is a sweet consoler, and the best private asylums in this country have come to be the *artful* —I use the word in its best sense—growth of surroundings whereby suitable relief is afforded to mental distress. In these institutions, nothing is allowed to give the notion or idea of restraint, everything is arranged to encourage healthy mental processes. Amusements and occupations are arranged to fill the mind with interest, to stimulate the weakened will-power, to cast away care, and to re-integrate the enfeebled physical and mental activities.

It is no illusion to assert that Art and Nature affect the mind, that pictures, poetry, and music are educative and recreative: how much greater may we say is the influence of one mind upon another? This is the basis of remedial mental treatment, and the whole discipline of a mental hospital may be summarised in two words, *education* and *encouragement.* I am often asked what forms the basis of mental therapeutics, in dealing with so subtle a substance—if you will permit the term for purposes of illustration—as the human mind, a substance which possesses both consciousness and self-consciousness, which is capable of exercising "will," and which has an outlook into the unknown future of time and life.

My answer is that we, who are charged with this responsibility, endeavour to suggest to our patients lines of thought which, we think, will neutralise or correct the effects of morbid ideas, and which will facilitate the normal appreciation of the outer world, and bring about the readjustment of disorganised thought. This is effected by controlling volition, inwardly as self-control, and outwardly in the daily routine and practice of life, and the essence of doing this consists in our ability to co-operate with our patient. The question is further put to me: "What drugs do you use directly to affect the mind?" and to this the reply is made that the cure of disease has not always nor wholly been by physical means, it being generally recognised that the success of any practitioner of the healing art depends upon his own skill, with a combination of the judiciously exercised belief in this skill, induced in his patient, and ostensibly with the co-operation of the patient. It is admitted that this door is open to charlatanry, and no doubt this induced belief in the sufferer is the secret of the success of many, if not most, of the historical cures attributed to holy rites, to ceremonies, charms, and mystic procedures, the healing touch of divinely-gifted persons, *e.g.*, for the king's evil, and the efficacy of pilgrimages to shrines and relics. One of the latest phases of this abuse of the induced belief on the part of the patient, and the power exercised by the healer, which has achieved the widest notoriety is the so-called Christian Science, based upon the doctrine that mental treatment is the sole factor in the cure of bodily ills. The reputed Mrs. Eddy, neglecting the tenets of physiology, endeavoured to teach the unreality of disease by preaching the divine origin of health, and there are many victims of her false dogmas, whose bodily symptoms were so neglected as to lead to serious and irreparable injury.

One word about that most essential factor in the preservation of a healthy mind, viz., the securing of a right proportion between activity and rest. Sufficient sleep is indispensable, and the want of it is attended with the worst consequences, for people have literally died from the want of sleep. It is not a question of six, seven, or eight hours, but of the special and peculiar needs of the individual himself, depending upon the nature of his inherited constitution, his work, and his general health. During the years of growth, longer sleep is needed, and the public and preparatory schools have done wisely in extending the hours allotted to rest.

A final word in regard to heredity. The recognition of the biological law that "like produces like" brings the question of the responsibility of human parentage into great prominence. It is the bounden duty of every unit in a social organism to do his best for his community, but I leave this aspect to the individual study of every medical man, convinced that each one of us must be supremely interested in the moral, mental, and physical perfection of human existence.

THE SURGICAL TREATMENT OF THE INCOMPLETELY DESCENDED TESTIS.[1]

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DURING the past few years, I have had the opportunity of observing the late results of several cases in which one testis, previously incompletely undescended, had been sewn by me to the scrotum, and being very dissatisfied with the results obtained, I was induced to investigate the subject further, and, through the courtesy of my colleagues, was enabled to gain information from 120 cases admitted into the hospital during the past five years.

I do not propose to criticise the opinions of other surgeons, but will content myself by giving the results of my investigations, and the conclusions derived therefrom.

The Age of the Patients.—

23 cases were admitted between the ages of 1 and 10.
64 „ „ „ „ „ „ „ 10 „ 20.
33 „ „ „ „ „ „ „ 20 „ over.

The Side most commonly affected.—It is usually stated that the testis is more commonly incompletely descended on the right side, a peculiarity explained on the ground that the left testis usually descends first, and has a longer cord. Looking at the series of 120 cases, in 63 the right side was involved, in 50 the left, and in 7 cases both sides were affected. In none of these seven was there any similarity or equality of failure in descent, one testis always being more deficient than the other. For instance, one testis would be abdominally retained, and the other in the inguinal canal, or one in the canal, the other in the pubic or pubo-scrotal region. The higher degree of retention was commonly seen on the right side, thus bearing out the usual rule.

The previous History.—In 30 cases, the patient sought advice on account of chronic or recurrent attacks of pain, not very severe, but sufficient to very considerably limit the individual powers of work,

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[1] A paper read before the Harveian Society.

In 9 cases, acute attacks of pain were complained of, associated with nausea or vomiting, and swelling in the region of the incompletely descended testis. Some of these were of such a nature as to suggest torsion of the testis, a condition found in one case operated on by Mr. D'Arcy Power. The great majority of cases, however, came to the hospital complaining of a lump in the groin, which, on investigation, proved to be the incompletely descended testis, associated with a hernial protrusion. So common indeed is it to find a peritoneal process that the combination of circumstances may be said to be the rule. The two conditions were found in over 90 cases, that is, in over 75 per cent. Examination in the erect position, and the later operative measures showed that the peritoneal process was almost always of the complete funicular variety, that is to say, that the testis was more or less enveloped by the contents of the hernial sac. Several cases also showed irreducible herniæ, a condition explained in those cases operated on by the discovery of an omental tag attached either to the testis itself, or to the sac wall. One case was admitted with a strangulated hernia, and two with inflamed irreducible herniæ.

In the majority of cases admitted under the age of ten, there was no appreciable alteration in the size and consistency of the affected testis, but in practically all those seen after the age of puberty, it could be readily determined that the incompletely descended testis had not undergone those developmental changes peculiar to the sound side. The affected organ was smaller and softer than on the sound side. Testicular sensation, though often impaired, was usually appreciated, whilst, on the other hand, palpation revealed that the affected testis was generally painful.

The inguinally retained testes were exceedingly mobile, usually retreating to the internal abdominal ring, or even into the abdominal cavity, and it was frequently necessary that the patient should be examined when standing up, in order to determine whether one had to deal with an abdominally retained testis, or one in the inguinal region.

After full exposure, by the splitting of the anterior wall of the canal, the following conditions were found :—

(*a*) *The Testis and Epididymis.*—Both smaller and softer than normal. The testis was generally implanted in the posterior wall of the sac, projecting, often by means of a well-marked mesentery, into the cavity of a voluminous processus vaginalis. The body of the testis and that of the epididymis were occasionally separated by an unusual development of the mesorchium, though this condition was rather the exception than the rule. The digital fossa was then correspondingly increased in depth and extent. The lower pole of the testis was, even in the more marked cases of deficient descent, usually connected with the base of the scrotum by a well-developed gubernaculum, suggesting some cause for the incomplete descent other than the traction, which is supposed to be exercised on the testis by the scrotal fibres of the gubernaculum.

(*b*) *The Processus Vaginalis.*—Very extensive in the region of the testis, often extending below the lower pole of that organ, and presenting above such an orifice into the abdominal cavity that the inguinally retained testis was readily reduced into the abdomen, whilst, on the other hand, omentum or gut was equally readily forced into the sac.

(*c*) *The Cord.*—The vas was usually tortuous, and obviously not in itself the main impediment to the lengthening required to bring the testis down to the scrotum, whilst it was equally obvious that the division of all constituents of the cord, except the vas and its artery, allowed, in some cases, of the scrotal reposition of the testis. One other fact requires mention. In several cases of inguinal retention, the pampiniform plexus of veins was herniated, or prolapsed through the external abdominal ring, and attached to the pubic region by a band of fibres, suggesting that the gubernaculum had obtained an undue purchase on some of the vascular constituents of the cord.

Microscopical Examination of the Testes removed.—The testis was removed in 50 cases, and, in 27 of these, the report as to microscopical examination was available.

In 15, those changes were seen which are regarded as typical of the ill-developed or atrophic testis, increase of fibrous tissue, imperfect epithelium, and deficient or absent spermatogenesis.

In 10 there was but little alteration from the normal, and definite spermatogenesis was present.

One was tuberculous and one malignant.

After these few preliminary details, I now turn to the question of treatment, and, for the purpose of having a clear field, I will limit myself almost entirely to those cases in which one testis is normally placed, whilst the other is imperfectly descended, either inguinal, pubic, or pubo-scrotal.

The various operative measures that are at our disposal are as follows :—

(*a*) To place the testis in the scrotum.
(*b*) To allow it to remain in the inguinal canal.
(*c*) To replace it in the abdomen.
(*d*) To remove it altogether.

All of these methods require, first, that the inguinal canal should be exposed from internal to external abdominal rings, the testis delivered and freed from the peritoneal process, and this process traced up to the internal abdominal ring, there ligatured and removed, the lower portion of the sac being retained for the formation of a tunica vaginalis, if the local conditions show that the testis can be saved. The testis being so freed and delivered, and all fibres of the cremaster muscle and other restraining bands snipped through with the scissors, one is then enabled to determine as to which of the various measures fits the case.

Method I.—To place the Testis in the Scrotum.—When a reasonable degree of traction is applied to the testis, freed in the manner explained above, it will usually be found that, whether the testis be inguinal, pubic, or pubo-scrotal, it will not lie comfortably in the scrotal bag, and that it tends to retreat in the upward direction as soon as the traction force is removed, whilst suture to the scrotum merely results in the invagination of the scrotal wall.

Two methods have, therefore, been adopted to aid in the lengthening process. (*a*) Division of all constituents of the cord with the exception of the vas, and the artery to the vas.

(*b*) Separation of the globus minor and body of the epididymis from the body of the testis, and the suture of the lower pole of the testis to the scrotum as before. After this separation, the testis, globus major, epididymis body, and globus minor, all lie, more or less, in a straight line.

The former method is regarded by some surgeons as an unwarrantable proceeding, mainly on account of the possibility of testis gangrene. This method was adopted in four of the 100 cases operated on, no immediate bad effects resulting. The ultimate result was investigated, one case offering a fair result, whilst, in the other three, the testis followed the usual course of upward retraction, and became soft, small, and atrophic.

The latter method was carried out in five cases with one fairly good result and four complete failures.

It is doubtful whether either of these methods possesses sufficient compensatory advantages to justify its utilisation.

In most of the cases in which scrotal placement was aimed at, the usual method was adopted, in which the lower pole of the testis was sewn through the scrotal wall, and the two ends of the ligature fastened round a small roll of gauze, and, in 29 cases, the final termination of the case was observed.

The results were as follows :—

Primary Inguinal Retention, 21 cases.

In 5 the testis again retreated to the inguinal canal.
In 6 the testis eventually became pubic in situation.
In 6 the testis eventually became pubo-scrotal.
In 4 the testis remained in the scrotum.

Primary Pubic Retention, 8 cases.

In 6 cases the testis again retreated to the pubic region.
In 2 cases the testis eventually became pubo-scrotal.

It will thus be seen that, of 29 cases, in which the scrotal placement of the testis was aimed at, the desired result was obtained in four cases only, and in these four cases the position was by no means ideal, for, though in one case the testis was well away from the abdominal external ring, in the other three the organ from its position very nearly fell into the pubo-scrotal classification.

It might be argued that in 12 of the operations on the inguinal testis, and in two cases of pubic retention, success was obtained, inasmuch as the testis was brought down to a lower level, the pubic or pubo-scrotal regions. Such, however, is not the case, for these regions are but ill-adapted for the testis, and for three main reasons.

1. Because the testis is there more than ever liable to injury.

2. Because the patients almost invariably complain of pain.

3. Because of the great liability to later degenerative changes.

Added also to these 29 cases, in 25 of which the operation resulted in failure, the same upward retraction was observed in 3 of the remaining 11 cases, before the patients had even left the hospital.

Altogether, therefore, the results of 40 cases of attempted scrotal placement may be summarised as follows :–

Four fair results.
Three promised unfavourably.
Eight not traced.
Twenty-five failures.

From these results it will be seen that scrotal placement is, except in the most favourable cases, doomed to failure from the very beginning.

Method 2. To allow the Testis to remain in the Inguinal Canal, after curing the Hernial Protrusion.—It is generally conceded that the testis must not be allowed to remain in the inguinal canal, on account both of the general inconvenience to the patient and the constant pressure exercised on the organ by the muscular strata between which it lies, and the degeneration that results therefrom. There are also certain other disadvantages to which the inguinally retained testis is liable. I allude to the alleged predisposition to malignant disease, to torsion, and to infection.

First, with regard to the question of increased liability to malignant disease, the following facts may be brought forward :—

1. Russell Howard reports that of 57 cases of malignant testis admitted into the London Hospital during 20 years, no less than 9 (15·7 per cent.) occurred in the retained, or incompletely descended testis.

2. In 54 cases of malignant testis, admitted to the Massachusetts Hospital, 6 (11 per cent.) were of the partially descended testis.

3. Schädel reports 41 cases of malignant testis 5 (12 per

cent.) in the incompletely descended organ.

It appears, therefore, that in every 100 cases of malignant disease of the testis, in between 11 and 15 the testis is incompletely descended, a very much higher ratio than that of the misplaced testis to the normally situated organ, probably about 1 in every 1,000.

With regard to torsion, statistics tend to show also that the incompletely descended testis incurs a special liability, and there is also some reason to believe that the misplaced organ is more than usually subject to tuberculous disease. I have personally removed two such tuberculous testes. Whether tuberculous or gonorrhœal infection is more common or not there can, at any rate, be no question that, in such circumstances, the possessor of a misplaced testis experiences greater discomfort and pain than in normal circumstances.

Perhaps no single reason suffices to definitely say that the testis must not be allowed to remain in the inguinal canal, but a synopsis of all the possible troubles and complications inevitably drives us to the conclusion that every effort must be made to remedy the position, or remove the organ entirely.

Of the two alternative measures for the remedy of the condition, scrotal placement and abdominal reposition, the former has already been discussed, and, with regard to abdominal replacement, all evidence tends to prove that the organ so placed loses its spermatogenetic function, whilst the internal secretion of the one normally placed testis amply suffices for the well-being of the individual.

It appears, therefore, that scrotal placement usually results in failure, that the testis must not be allowed to remain in the inguinal canal, and that nothing is gained by the abdominal reposition of the single affected organ, and consequently that the best interests of the patient are secured by the removal of the affected organ, and the complete closure of the inguinal canal.

The testis was removed in 50 cases, and whether the patients were below or above the age of puberty, there was apparently no alteration either in the development of the individual, or in the procreative powers of those who entered into the marriage state.

In connection with the question as to whether there is any compensatory hypertrophy of the normal testis, the misplaced organ having been removed, I am of opinion that such hypertrophy does often occur. This is contrary to the general opinion, but I have seen several cases in which the remaining testis was a good deal larger than normal.

Summarising now with regard to the treatment of a patient with one incompletely descended testis, the condition may be watched up to about the seventh year of life, after which operation should be advised in case of failure in scrotal descent. After full exposure and division of cremasteric fibres and all restraining bands, and removal of the peritoneal process, the operator will be enabled to gauge the possibility of scrotal placement. If this is apparently impossible, the testis should be removed, a radical proceeding, no doubt, but one that is apparently indicated by the almost inevitable failure of all palliative measures, and by the absence of any physical or mental alterations in those patients in whom such a course had been adopted.

Finally, with regard to the question of double incomplete descent. Double abdominal replacement has been advocated, the hernial protrusion being cured and the canal closed up. With this view, however, I do not agree, and for two main reasons.

1. The abdominally replaced organs almost certainly lose their spermatogenetic powers.

2. The inguinal, pubic, and pubo-scrotal organs retain, in about 40–50 per cent. cases, some spermatogenetic power, at any rate up to about the age oI 30–40, and, so far as one is able to state, the inguinal testis retains this power longer than the pubic or high pubo-scrotal varieties.

In cases, therefore, of double incomplete descent, operative measures should again be carried out well before the age of puberty, the canal exposed, the testis delivered and the hernial protrusion cured. If the cord is fairly long, the testis should be sewn to the scrotum. In other circumstances, it is preferable that the testis should be allowed to remain in the inguinal canal. The usual disadvantages of such testicular position will be experienced, but the patient will, at any rate, have the advantage of possessing some power of species reproduction if he marries early.

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SOME EXPERIMENTS IN THE TREATMENT AND PREVENTION OF INFECTION IN ENTERIC FEVER.

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FOR many years enteric fever may be said to have been one of the battlefields of therapeutics, and there have been, in fact, but few drugs that have not been given in this disease, in the hope that the prolonged pyrexia and its effect on the metabolism of the patient might be thereby shortened or modified. Unfortunately, medical literature abounds in records of series of cases, in which the numbers treated are so few that the well-known tendency of the disease itself to vary in type has not been eliminated. Moreover, it has not been always clear that the recorded change for the better in the condition of the patient has not been due to alterations in the diet and environment of the case which had coincided with the administration of the particular remedy. It is essential that a large number of cases should be taken, in order that these errors shall be eliminated as far as possible.

The experiments with drugs have, naturally enough, been directed mainly towards the group of so-called intestinal antiseptics, in the hope of finding some chemical preparation which would kill the bacteria *in situ*, or modify their power of toxin formation.

For this to be even theoretically possible, however, there are certain essentials. The drug must be capable of killing the B. typhosus .in vitro within a reasonable time in a dilution, which can be safely given to a patient. Then it must either reach the site of the toxin formation, or neutralise the toxins themselves in circulation. It must also give rise to no deleterious by-effects when given internally.

It is not pretended, so far as I am aware, that any chemical preparation will neutralise the circulating toxins; it can only in theory prevent their formation by killing the organisms. Nor has it been found possible, in the case of enteric fever, to prepare a true antitoxin by the usual series of bacterial experiments on animals. We are driven then to the class of true germicides.

It is not difficult to find drugs that will satisfactorily kill the B. typhosus in vitro. Their name is legion, but a large number of these, such as mercurial preparations and carbolic acid, cannot be administered in the smallest doses which the experiments in vitro have demonstrated to be essential, without poisoning the host. We must then use a non-poisonous germicide.

Then it must reach the part of the body where the bacteria are present. Now, any antiseptic must be either soluble or insoluble in the fluids of the digestive tract. If soluble, the chances are that it will be absorbed before it reaches the intestinal ulcers, while if insoluble, it is difficult to see how any germicidal effect can be produced; in practice, insoluble germicides are usually passed unchanged per rectum, and the members of this class are of very feeble germicidal power, and have the additional disadvantage of being irritating to the inflamed intestinal lining.

Attempts have been made to avoid this difficulty by administering soluble germicides in capsules made of some such substance as "Keratin," which is supposed to resist the gastric, but to be soluble in the intestinal contents, so that the drug is liberated at the spot where it was supposed to be required. This is all very well when the intestine is not itself inflamed and ulcerated, but it may be highly dangerous in such a disease as enteric fever. Moreover, in practice, these capsules frequently do not dissolve in the intestine at all, but are passed intact per rectum. So this method is certainly dangerous, and probably useless as well.

We may, I think, conclude that it is impossible, in practice, to give any chemical which will be capable of reaching ulcerated surfaces throughout the intestine, and which will then be adequately germicidal.

Consequently none of the work on the administration of so-called intestinal antiseptics has been very successful, and it is the belief of most of those, who have to treat enteric fever in bulk, so to speak, that drugs are useless except for the relief of certain well-marked symptoms. I say at once, however, that, if some five or six instances only are taken, a case can be made out for the beneficial effect of almost any drug. It is on diet that we are inclined to chiefly rely in dealing with enteric fever, and the improvements which have resulted, not only in the mortality, but also in the convalescence and freedom from complications, since it has become the custom to give solid food in the acute stage, have been most marked. On this point I cannot do better than refer to a paper by Dr. Meredith Young.

In the scepticism as to the value of intestinal antiseptics, I have fully shared myself, and it is necessary to point out that, previous to the experiments which I shall now record, the treatment of enteric fever, by a fairly liberal and varied assortment of solid and partially solid food, has been the rule at Monsall Hospital for some time—I can vouch personally for the last six years. In the present series of cases this custom has also obtained. Water has also been given by mouth very freely.

But I have not become sceptical about the use of drugs without personal experience of them. I think I may say that I have tried almost every intestinal antiseptic that has been recommended by anyone having authority. In the case of chlorine solutions, salol, beta naphthol, creasote, thymol, and menthol, my experience has been fairly extensive, but all have been abandoned, because I could not convince myself that any of them modified the course of the disease, while each had the disadvantage—and this is important—of either increasing intestinal peristalsis, or of interfering with the appetite of the patient. When solid food is to be given, as I believe it must be if possible, the absence of the latter effect is essential. The most that can be said about salol, beta naphthol, thymol, and menthol is that they prevent a certain amount of intestinal putrefaction, and may thus be useful if there is much abdominal distension, but intestinal putrefaction is not typhoid fever, or even an essential part of it. The chlorine preparations may be germicidal, and, as a matter of fact, I gave them a long trial after the method recommended by Burney Yeo, but their inhibitory effect on the appetite was most marked, and I should not have tried them for so long had I then as much experience as I now possess on the importance of the dietary factor in enteric fever. Moreover, we know that the germicidal effect of chlorine preparations is very greatly diminished by the presence of organic matter, which of course abounds in the intestinal tract.

In the light of modern research, however, it is not desirable to concentrate our attention too closely on the site of the ulcers in enteric fever, and it may be as well to briefly summarise the extent of our knowledge of the distribution of the bacilli themselves. In the first place, it is evident that the organisms are present in the circulating blood in a large number of cases. Coleman and Buxton, for instance, found the B. typhosus in 93 per cent. of cases examined at the end of the first week, in 76 per cent. at the end of the second, 56 per cent. in the third, and 32 per cent. in the fourth weeks. Then, from the researches of Jurgens and others, we know that, in the alimentary canal itself, the bacilli are present in greater numbers at the duodenal region than in the neighbourhood of the ulcers, and that the bile almost invariably contains large numbers of them. It would thus appear that the organisms are poured into the intestine at its duodenal end from the blood, and also indirectly through the hepatic secretion. Then they may be found in the urine, the frequency with which positive results are obtained in this connection varying with different observers, and probably also with the type of disease and with the period selected for observation. Maione, for instance, obtained a positive result in 40 per cent. of his cases, but very rarely before the eighth day. I myself last year examined the urine from 81 cases, 205 specimens having been collected with due precautions. In 183 B. coli was present—when this was found, I did not make any attempt to isolate B. typhosus also, so in any case this organism may or may not have been present; in 13 instances B. typhosus was present alone. For the purposes of this investigation it is not necessary to distinguish between the two organisms.

The practical outcome of these researches is that, if we are to attempt to destroy the typhoid bacilli themselves, we must attack them in the circulating blood, or in the higher region of the intestine, and it is also probable that we can control our results to a certain extent by observing whether or no the urine ceases to contain organisms of the coli-typhoid group as the case progresses, the natural tendency being, in cases not treated by any antiseptic, for these bacilli to be found in the urine more frequently as the patient progresses towards convalescence. It is not necessary to pay much attention to its action, or supposed action, on the ulcers themselves.

It is then essential to select a drug that shall be highly bactericidal to B. typhosus, easily absorbable, non-toxic, and is not chemically changed by the presence of organic matter in excess.

It appeared to me that these requirements would be likely to be best fulfilled by a preparation called Medical Izal Oil. I need not describe its constitution here, but I would point out that it is the basis from which commercial Izal fluid is prepared, but purified and deprived of some of its hydrocarbon constituents. I should add that the oil is only supplied on physicians' prescriptions or to medical men.

It is evident from the work of Delepine, Klein, Kenwood, and Hewlett, M. Wynter Blyth, and others, that the ordinary Izal fluid of commerce is an exceptionally powerful germicide for bacilli of the coli-typhoid group. Thus, Klein found that a solution of 1 in 500 completely disinfected typhoid stools in fifteen minutes, and a similar solution of 1 in 600 rendered typhoid urine aseptic in five minutes.

More recently, a carbolic acid coefficient of no less than 18 has been obtained for B. typhosus with medical Izal which contains only 40 per cent. of the oil. That it was not toxic, I had learnt from previous experience, as I have been accustomed to apply medical Izal, in its undiluted condition, to the fauces and interior of the uterus in cases of scarlet and puerperal fever respectively. It has been shown also that Izal oil, in doses of 13 minims per diem, could be administered to a normal adult in capsules without discomfort, and that the number of intestinal organisms detected in the fæces was very largely diminished while it was being administered, and that their number rose again to the former amount when the Izal was discontinued. I do not regard the latter fact as of importance in the present connection, as I think it is evident that we need not concern ourselves very much with what takes place in the lower intestine. The value of this research for my purpose lay in showing that the Izal oil could be given by mouth. Then

Tunnicliffe found by experiments on animals that Izal was intensely toxic to the lower forms of animal and vegetable life, and that, as the scale is ascended, its toxicity diminishes. He found also that it had both a diuretic and diaphoretic action when given internally, but to this point I shall return later.

Inasmuch as it was necessary that the drug should be fairly easily absorbed, M. H. Gordon's method of administering it in its raw state in capsules was not adopted, and it was thought that an emulsion would probably not be much affected by the acid gastric juice, and would thus reach the upper part of the small intestine, where, as we have previously seen, the bacilli do most abound. I have found in practice that the addition of either artificial gastric juice, artificial pancreatic juice, or fresh bile to the emulsion of Izal oil does not alter its physical properties in any way.

I at first gave the medical Izal fluid, but soon found that this preparation was not so suitable for internal use, as an emulsion of medical Izal oil in mucilage of tragacanth in the proportion of three minims of oil to each ounce of emulsion. In some cases it was found advisable to dilute this still further. It was soon found that very much larger doses of the oil could be given than had been the case in M. H. Gordon's experiments without any deleterious effects. Ultimately, I settled on a routine dose of two ounces of the emulsion every two hours during the day, and every four hours at night-time, the dose being followed in each case by a draught of water.

This quantity was easily tolerated by the average male patient, and by many females, and though at first there was often some nausea, yet after the first two or three doses it was well borne by the patient, and, in fact, many rather liked it than otherwise. In a few cases, tolerance was not successfully established, and the drug was discontinued.

The next point was the selection of the cases. In the first place, obviously moribund cases were excluded by withholding Izal for 48 hours after the admission of any patient who appeared to be *in extremis.* These cases were six in number. Then it appeared to be advisable to exclude all those who were admitted after the acute stage was passed, and those who were suffering from mild attacks. To have administered Izal to these would have given a false idea of the value of the drug, for they would probably have recovered equally well under any other treatment. It is, therefore, not possible to make a mathematical statement on the matter, but it is obvious that a better idea of the action of the remedy could be obtained by treating only severe and moderately severe cases with it. Every case discharged from Monsall Hospital from January 1, 1907, to January 14, 1908, has been recorded.

As previously mentioned, no change whatever took place in the routine methods of dieting or of nursing, while any other drugs were given for the treatment of symptoms only, and in practice these included alcohol and opium only, with chloral or bromide of potassium occasionally as a hypnotic. Cold baths were not given as a routine measure. To all patients as full and as varied a diet was given as was possible, and all were encouraged to drink very freely of water or barley water. There was no alteration either in the character or the severity of the cases admitted in 1907 as compared with those in previous years.

From each patient on admission, a sample of the urine was taken with due aseptic precautions, and examined for B. coli by cultivation on the usual media, and also by observation of hanging-drop preparations from growth in glucose broth. If B. coli was indubitably present, B. typhosus was not looked for, but if B. coli was absent, the usual further tests were applied for B. typhosus, including the reaction obtained with typhoid serum of known agglutinating power. Further specimens of the urine were examined from time to time during the patients' stay in hospital. In every case, in both series, a positive result was obtained with the patient's own serum to Widal's test, a dilution of 1 in 30 and 1 in 100 being, as a rule, employed. In some instances, Professor Delepine had also obtained a positive reaction in his laboratory before the admission of the patient. There can be no doubt, therefore, that every patient in the two series was actually suffering from enteric fever.

The urine of each patient in the typhoid wards at Monsall is measured from day to day, and the results recorded in graphic form on a special chart. These records were, therefore, used for the present series. Where incontinence is present the fact is shown in the daily record.

Similarly, a record is always kept of the number and character of the stools. In almost every case diarrhœa was present on admission, but, as I have elsewhere shown, this usually subsides under treatment in hospital by appropriate dieting. In the tables annexed, "Diarrhœa" means that looseness of the bowels persisted for more than three days after the admission of the patient. For various reasons, into which it is not necessary to enter now, I regard this period as sufficient to eliminate diarrhœa due to previous error in dieting, and any looseness which persists after this as due to the disease itself.

The results obtained were as follows:—

RESULTS.—CLINICAL RECORD.

No. of deaths in the non-Izal series - 13 = 11·4 per cent.
No. of deaths in the Izal series - - 2 = 4 „
One of which was due to perforation of the intestine.
No. of cases in the non-Izal series, in which diarrhœa persisted after three days from the patients' admission to hospital - - - - 47 = 41·2 per cent.
No. of cases in the Izal series, in which diarrhœa persisted after three days from the patients' re-admission to hospital - - - - 7 = 14 per cent.
Total amount of urine passed daily by all the patients before taking Izal (excluding those with incontinence) - = 1,400 ozs.
Total amount of urine passed daily by all the patients after taking Izal (average of 10 days) - - - = 3,880 ozs.
Average daily quantity of urine per patient before Izal - - - = 31 ozs.
Average daily quantity of urine per patient after Izal - - - - = 86 ozs.
Average day of disease on which Izal was commenced - - - = 13th.

Total number of consecutive cases - - -	164
Total number taking Izal oil throughout - -	50
Izal oil not administered to - - - -	114

Of these 114,

64 occurred either before Izal treatment was commenced, or during my own absence.
6 were obviously moribund on admission.
3 could not take Izal on account of violent delirium, or unconsciousness, and subsequently *died.*
2 could not take Izal on account of violent delirium, or unconsciousness, and subsequently *recovered.*
2 were suffering from advanced tuberculosis as well as enteric fever, and were discharged relieved.
3 were not undoubtedly suffering enteric fever on their admission, though they were subsequently found to be so.
4 were unable to take Izal oil on account of nausea or vomiting.
28 were thought to be suffering from the disease in too mild a form for useful comparison to be made.
2 were treated by other drugs.

114

BACTERIOLOGICAL RECORD.

Number of cases examined bacteriologically throughout not taking Izal (A) = 81.

Number of cases examined bacteriologically throughout taking Izal (B) = 46.

(Fifty cases were treated with Izal, in four of which specimens could not be obtained on account of incontinence of urine.)

Total number of bacteriological examinations in Class A = 205.

Total number of bacteriological examinations in Class B = 191.

Of these in Class A, B. typhosus, or B. coli, or both were present in 196 tests = 95 per cent.

Of these in Class B, B. typhosus, or B. coli, or both were present in 50 tests = 26 per cent.

Number of cases in Class B in which B. typhosus, or B. coli, were found on admission, 38 = 76 per cent.

(In four cases (incontinent) examination could not be made; in the remaining eight the urine remained sterile.)

Of these 38 cases, the urine ceased to contain these bacilli in periods varying from 3 to 14 days, average = 7 days.

In three of these the bacilli reappeared for periods ranging from one to 5 days, the urine being subsequently found to be sterile.

We have, therefore, 50 completed cases of undoubted enteric fever to whom Izal oil has been administered in large quantities, and we are now in a position to draw certain inferences which are as follows:—

1. It is evident that no deleterious effects have resulted from the drug itself. Only in three cases, either pronounced nausea or vomiting, which recurred on the repetition of the does, made its administration undesirable. In the majority, tolerance was easily established. According to my previous experience with chlorine solutions (prepared after the method of Burney Yeo), Izal is much less distasteful in practice than chlorine, and I had found it in practice impossible to feed the patients, who were taking Yeo's mixture, on solid food, owing to the fact that their appetite was almost always impaired. In the Izal series no disturbance of appetite took place, and the patients took their food as well as those to whom it was not administered. In fact, it would appear that patients either cannot take Izal at all or take it readily.

I may say that I would regard any line of treatment that disturbed the appetite in enteric fever as quite inadmissible.

The quantity of Izal oil taken by each patient in the twenty-four hours was 54 minims, and this dose was continued for periods varying from 'one week to eleven weeks, the average being four weeks. The average quantity of Izal oil taken by each patient was therefore three and one-tenth ounces.

2. The results, obtained by Tunnicliffe on animals, shown in his paper on the pharmacology of Izal, are borne out in this series. Of these, the most important from the therapeutical point of view are the effect on the skin and kidneys. Though it was not found possible to record the former statistically, it was quite evident from the reports of the sisters in the wards that diaphoresis was almost always produced in the Izal cases. In fact, the amount of extra work involved in repeatedly changing their shirts was

mentioned somewhat feelingly. I also noticed that the patients were perspiring freely on many occasions. In the case of the kidneys it is possible to make a statistical statement. In every case, a rise in the daily secretion of urine was noticed, while in many marked polyuria was observed. This increased secretion did not persist when the Izal was discontinued. The diuretic effect is shown graphically on some of the actual ward charts.

This is partly due to the fact that Izal made some patients decidedly thirsty so that they drank water more readily, but this is not a complete explanation, inasmuch as it had been the custom, for some time past, to force water in large quantities on every patient, who is suffering from enteric fever, and the increase in the urinary secretion was not nearly so marked in the cases to whom Izal was not given. I think therefore we must ascribe a genuine diuretic action to Izal.

Both the diuresis and diaphoresis are of great advantage clinically, inasmuch as they mean increased elimination of toxins. In my opinion, Izal is more effective in this respect than the cool bath, and is certainly capable of more extensive application than the latter. I do not regard the cool bath as a desirable routine measure, though I have given it a very full trial. In certain patients of robust physique, where delirium and sleeplessness are marked features, the bath is often of great value, but there are many patients for whom it is quite unsuitable and even dangerous, especially in the late stage of the disease at which they are so often sent to us.

3. It was soon noticed that the mouths remained much cleaner in the Izal cases. I have always regarded oral sepsis as an important factor in enteric fever, inasmuch as its presence not only interferes with the feeding and digestive capacity of the patient, but is itself a predisposing cause of tonsillar and laryngeal infection. In all probability, a certain amount of the Izal is excreted from the buccal mucous membrane, and serves to inhibit the growth of the oral organisms: certainly the work of the nurses in respect of the toilette of the mouth was conspicuously diminished thereby.

4. The effect on the bowels was also somewhat remarkable. It was evident that diarrhœa was much less persistent in the

Izal series. I need not dwell on the value of Izal in this connection, inasmuch as anything which tends to diminish peristalsis must be beneficial to that extent in enteric fever. Absence of diarrhœa means not only increased ability to take tissue-sparing food, but also diminished liability to hæmorrhage from, and perforation of, the intestine. Even if constipation results, its treatment does not present any practical difficulty.

As a digression, I must say that it appears to be evident that many practitioners cannot diagnose enteric fever, until they have produced diarrhœa by giving the patient too much milk.

5. It is I think obvious that the patients, to whom Izal was administered, did better than those without the drug. As I have remarked, it is not possible to make a statistical statement on this point with any accuracy, but the number of cases treated in this way is sufficient to give one an impression of some value clinically. Only severe and moderately severe cases were included ln the Izal series. Every patient, in fact, seemed on admission to be acutely ill, and to be in some danger of his life. Delirium was present in all, and there can be no doubt that the patients in the Izal series became rational, and were able to take food sooner than those without it. I cannot say that the character of the pyrexia presented any marked difference in the two series, but this is not of any practical importance. For one thing, a very much larger number of charts would have to be collected in order to enable one to eliminate the very numerous fallacies to which deductions from the pyrexial records are liable, and then, I think, one may safely say that those who see enteric fever in bulk do not attach much importance to the temperature apart from the patient's reaction to it, and this—by far the most important factor—cannot be recorded graphically. Izal, however, does not appear to be an antipyretic. Even a large dose, administered when the pyrexia is high, is not followed by a fall in the patient's temperature.

Turning now from the clinical aspect of the cases, it is evident that Izal has some considerable value from the public health point of view. It will be seen from the record that, in those patients to whom it was given, the urine ceased to contain bacilli of the coli-typhoid ground within a comparatively short time after its administration, and that at a time—after the second week—at which they are found the most readily. In considering B. typhosus and B. coli together, in this connection, I do not, of course, suggest that they are closely allied clinically, but, inasmuch as B. coli is the more resistant of the two, it may be inferred that, if it is killed, the B. typhosus will disappear also. It is to be regretted that opportunity has not occurred for the observation of the effects of Izal on B. typhosus in the circulating blood, but, inasmuch as it is only found in this situation in the early stage of the disease, I have not been able to make any statement on this point.

The urine of enteric fever patients can be sterilised quite easily by such drugs as urotropin and helmitol, but, so far as my observations go, the sterility is not permanent, and the urine is apt to contain organisms again as soon as the drug is discontinued. In the Izal series, it will be seen that the sterility was usually maintained. Between the action of the urotropin group and Izal there is a wide difference; the former depend for their action on the production in the urine of formalin or a derivative, so that the urine is itself not only aseptic, but antiseptic. Izal, however, has been shown not to be excreted in the urine, and I found, in practice, that the urine of those taking Izal did not contain any free antiseptic, as judged by its action on cultures of known organisms. It also became putrid as rapidly as normal urine after standing. In other words, the group of urinary antiseptics would appear to act by killing the bacilli when they get into the urine, and Izal by preventing their arrival there at all. I would regard Izal, therefore, as a general antiseptic, rather than merely an intestinal or urinary disinfectant, and on that account as of more value in enteric fever.

I should add that I have examined the urine throughout in 85 cases, taking either salol, acetozone, B. naphthol, or chlorine solutions, but have not found any bactericidal effect from any of these preparations, as tested by the presence of B. typhosus and B. coli in the urine.

I think we must regard the persistence of typhoid organisms in the secretions as of considerable importance from the public health point of view. From time to time, reports of so-called "typhoid carriers" have appeared, in which it has been shown that the bacilli may become saprophytic, and continue to flourish in the patient after he has apparently recovered, and has returned to his usual environment. Klinger, for instance, in an examination of the stools of 482 cases of enteric fever, came to the conclusion that 1·7 per cent. became chronic typhoid carriers. There is also the well-known case, reported by Kayser, of the Strassburg baker in whose excretions typhoid bacilli were detected in large numbers ten years after she had recovered from an attack of enteric fever. She had apparently been infecting her fellow-workers during the whole of this period.

It has not been the custom, hitherto, in any hospital so far as I am aware, to examine the excreta of enteric fever patients as a routine measure before their discharge. As regards the fæces, this would be impracticable, on account of the bacteriological difficulties of the examination, but it could be done in the case of the urine in any well-equipped laboratory without much difficulty. So far as this present series goes, it would appear that the action of Izal may reasonably be said to be permanent, and the drug is, therefore, of undoubted value to the patients' environment. Moreover, it is of distinct importance to protect the nurse and the attendants in fever hospitals from infection through excreta, and any method, by which this can be effected before they leave the body of the patient, is undoubtedly superior to any process of subsequent disinfection.

Summing up the results of this and of previous work on the subject, it is evident that:—

(1) Medical Izal oil is a peculiarly efficient germicide in vitro for bacilli of the coli-typhoid group.

(2) It can be given internally in the form of an emulsion in large doses, without any ill effects, and its administration can be continued for a prolonged period.

(3) It does not disturb the appetite of the patients to whom it is administered: after the first two or three doses the patients do not, as a rule, dislike it.

(4) It does not increase peristalsis, and in practice tends

to check diarrhœa when this is already present.

(5) It acts as a diuretic and as a diaphoretic, and, therefore, increases the elimination of circulating toxins.

(6) When bacilli of the coli-typhoid group are present in the urine, they usually disappear when Izal is given, and, provided that the drug is administered for a sufficiently prolonged period, the organisms do not reappear when the patient is apparently well.

(7) This germicidal effect as regards the urine is not given by other antiseptics that are commonly given in enteric fever.

(8) So far as these observations go, the case mortality is considerably diminished by the administration of Izal, and the disease is prone to run a more favourable course, especially in the acute stage.

(9) These beneficial results have occurred, notwithstanding the fact that the administration of the drug was not begun, as a rule, until the end of the second week of the attack, and in a series from which all mild cases were eliminated.

It would, therefore, appear that medical Izal oil is of considerable value in enteric fever, both in the treatment of the patient, and in the prevention of infection of his environment.

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A REVIEW OF SOME RECENT WORK IN GYNÆCOLOGY.

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A.—OVARY.

1. *Ovarian Grafting.*—Robert T. Morris[1] records a case in his practice of heteroplastic ovarian grafting followed by pregnancy and the delivery of a living child. The patient, Mrs. W., was 21 years of age, commenced to menstruate at 15, and ceased at 19, the function being described as being "of an average character." She was married at 18, became pregnant soon after, and miscarried at the third month. For two years previous to her entrance into the hospital, the patient had suffered from pelvic pains, headache, and hot and cold flushes, all of which had steadily increased in intensity, and were most marked at those times when the monthly flow should have appeared.

Morris made a diagnosis of cirrhotic ovaritis and asked the patient to remain in the hospital until an opportunity presented itself for obtaining ovarian grafts from some other patient to replace her own ovaries which were to be removed. On February 11, 1902, Boldt had occasion to operate upon a patient, Mrs. P., 33 years of age, and the mother of three children, for a uterine prolapse. During the course of this operation, the ovaries being observed to be normal, excepting for the congestion common to prolapse cases, two wedge-shaped grafts were removed from them and placed in physiological saline solution at a temperature of 100° F. The abdomen of Mrs. W. was then opened by a short median incision and the ovaries removed with Tuffier's angiotribe. The reason for choosing this method was that the absolute removal of all ovarian tissue by ligature is, in the author's opinion, apt to be incomplete.

After the removal of each ovary, a slit was made through the posterior layer of the broad ligament on either side, and into these was placed a segment of the ovary (½ an inch long and ¼ of an inch wide) which had been removed from Mrs. P. The grafts were maintained in position by a single catgut suture, and were so placed that their cut surfaces lay in contact with the cut surfaces of the broad ligament, the uncut surface of the ovary being allowed to project into the peritoneal cavity to facilitate the free escape of ova. The uterus and Fallopian tubes were apparently normal. The patient made an uneventful recovery from the operation. The ovaries removed from Mrs. W. were submitted to microscopical examination subsequently, and were reported by the pathologist to be cirrhotic ovaries distended with many small cysts and containing no formed Graafian vesicles.

On June 18, 1902, four months after the grafting, menstruation returned and lasted for five days. With the exception of one day's loss in November, the period did not reappear until December. Menstruation after that became regular, and the loss continued for 4 to 5 days. On March 15, 1906, the patient was delivered of a daughter, weighing seven and a half pounds.

The age of the patient, and the fact that the uterus had not undergone atrophy, rather tend to show that the case may have been one of suspension of the ovarian function rather than of a premature menopause. Morris looks upon this as a successful case of heteroplastic ovarian grafting, founding his opinion upon the reliability of his technique, and the certainty that both Mrs. W.'s ovaries were entirely removed. He lays special stress upon the fact that those organs were removed by the angiotribe, and not by ligature, a point in the technique which he considered was instrumental in eliminating all sources of error. His conclusions are not, however, altogether convincing. In a case of such importance, it is to be regretted that fuller details were not supplied by the pathologist. As it stands the report is practically useless, as no serial sections were made. The fact that there were no evidences of functionating ovarian tissue found in the sections by no means proves that there was no active tissue present, some of which may have escaped removal.

It would be interesting to know which parent the child of Mrs. W. most resembles. For hereditary characteristics, according to Haeckel, are due to cell memory, and the cell memory of an engrafted ovum need not necessarily be changed by the influence of its new host. Apart, however, from the medical aspect of the case, a problem of considerable legal and sociological interest arises in determining the question from whom is the child descended—Mrs. P., who presumably provided the ovum, or Mrs. W., who nourished and bore her?

Successes of a like nature have been claimed by Glass, Dudley, and more recently by Cramer.

Glass[2] took a healthy ovary from a girl of 17 and sutured it in the broad ligament of a girl of 29, who had been suffering from the symptoms of the menopause ever since the removal of her ovaries two years previously. Uterine hæmorrhage appeared 16 days after the operation, and continued for two days; six months later another flow took place, and continued for three days. The patient eight months after the operation felt perfectly well.

Cramer[3] had a patient, aged 23, who suffered from superinvolution of the uterus and all the symptoms attending a premature menopause. The patient and one suffering from osteomalacia were simultaneously operated upon, the ovaries of the latter being engrafted on to those of the woman suffering from superinvolution. Both patients recovered. The superinvoluted uterus increased in size, the symptoms of the menopause disappeared, menstruation returned; the patient became pregnant four and a half months after the operation, but unfortunately aborted.

Chrobak was the first to suggest the feasibility of ovarian grafting in the human subject. He pointed out that, compared with the physiological one, the artificially induced menopause is much more severe, and tends to become more so the younger the patient. He was, therefore, a strong advocate for the preservation of ovarian tissue where possible. Acting upon this suggestion, his assistant Knauer[4] performed a series of operations upon rabbits, removing both ovaries and transplanting them to various positions in the body, such as in the mesometrium, in the uterus, or between the layers of the abdominal wall (*i.e.*, homoplastic transplantation). As a result of his experiments, he concluded that the ovaries can be transplanted, and are capable of being nourished and of continuing to discharge their functions to a variable extent, and that as a consequence normal pregnancy and delivery might result. A certain amount of the transplanted ovary, he found, always perishes. If the whole ovary dies the genital system atrophies, but as long as the ovary remains functionally active and forms ova, so long it continues to exercise its influence upon the organism as a whole and upon the uterus in particular, no matter in what part of the body it lies. These results were confirmed by Grigorieff, who performed four cases of homoplastic ovarian grafting and reported one pregnancy followed by birth of a well-developed fœtus at full term, and also quite recently by Marshall and Jolly,[5] who performed experiments of homoplastic and heteroplastic transplantation of the ovaries of rats, generally by peritoneal grafting; a considerable number of the former were successful, but of the heteroplastic only two were satisfactory, in one the graft being made upon a rat of the same litter as the one from which the ovaries were removed, and in the other the two rats were probably sisters, though that was not quite certain.

Successful and definite as these results of grafting appear to be, it must not be overlooked, however, that other men, working on the same lines, have not been so fortunate, many of their experiments having failed.

In order, therefore, to obtain some personal knowledge of ovarian grafting from a surgical standpoint, Scott Carmichael[6] undertook some experiments for the purpose of finding out:—

(1) Whether grafted ovaries degenerate.

(2) If they degenerate, to what extent?

(3) What part of the ovary is most affected?

(4) If ovarian tissue lives, has it the power of performing its functions?

The experiments were carried out for the most part upon rabbits which were all full grown, but varied considerably in age. The sites of transplantation were the uterus, parietal peritoneum, between the layers of the muscles of the abdominal wall, and under the mammæ. In all, 21 ovaries were transplanted, and complete failure was recorded in six cases, the tendency to degeneration and final absorption of the transplanted ovaries did not, however, seem to be a rapid one, taking 3 to 4½ months, and in two cases even longer. Of the remaining 15 cases, in two the transplanted ovary, as a whole, remained undegenerated, showing the germinal epithelium, primordial Graafian follicles, and ovarian stroma in a good state of preservation, while in 13, there was almost complete success in that Graafian follicles were present in 10 cases, and in 4 of them had matured and contained healthy ova with all the contents of the follicle intact.

These experiments, though not always attended by success, have satisfied the author that the whole ovary or part of it can live in its new position, and that the preservation of ovarian tissue seems to depend considerably upon the site of implantation, and, where pregnancy is not desired, that there is a much greater chance of a successful result from grafting on to the parietal peritoneum. To what extent the ovarian tissue is capable of performing its function is much more difficult to determine. Its power to ovulate must be admitted, but its power to exercise its internal secretory function must be looked upon with considerable doubt, according to this observer (though this does not tally with the observations of Marshall and Jolly, who found that the uterine degeneration which follows simple removal of the ovaries did not occur in the cases in which transplantation of the ovaries was successfully effected, thereby showing that the influence of the ovaries upon the uterus is chemical rather than nervous and probably due to an internal secretion). The age of the animals experimented upon appeared to affect the results, the most successful cases being in animals which were scarcely full grown. Although Carmichael succeeded in two cases in grafting the entire ovary without any degeneration, yet in most cases there was extensive degeneration, either fibrous (atrophic), or cystic of the central portion of the ovary, so that he cannot but conclude that entire ovarian grafting in any but the smallest animals must be attended with more or less failure. As regards the human subject, he considers that grafting of portions of the ovary will almost certainly be done with success, but to have successful results with the entire ovary must be a matter of great uncertainty. The part of the cortex most liable to degenerate is the germinal epithelium, the ovary and Graafian follicles being next in the order of their frequency. Cases in which pregnancy has occurred after grafting are always open to the obvious criticism that a portion of the ovary may have been left behind. The results of these experiments show:—

(1) That in the rabbit the whole ovary may be transplanted with success.

(2) That in the majority of cases (about 80 per cent.) there is a partial degeneration of the ovary.

(3) That the ovary may undergo either a fibrous or cystic degeneration.

(4) That the Graafian follicles and ova persist and mature some months after grafting, but ultimately tend to become cystic.

(5) That the germinal epithelium persists in a small percentage of cases.

From these results the following conclusions appear to be justified, so far as grafting in the human subject is concerned:—

(1) That it is unlikely that the whole human ovary can be grafted with success.

(2) That part of the ovary may ovulate and preserve its function of internal secretion.

(3) That partial grafting is more likely to succeed, *i.e.*, the grafting of the cortical portion of the ovary more especially.

2.—*Complications arising in Sixty-three Cases of Ovarian Tumours, with special reference to Malignancy.*—Norris[7] points out that malignant growths of the ovaries may occur in two ways: either a healthy ovary may be primarily attacked by a malignant growth, or a hitherto benign ovarian cyst, which may have been present, for some time, may become the seat of a carcinomatous change. No reference is made in the paper to metastatic new growths of the ovary. There are undoubtedly many cases of malignant disease of the ovaries which do not come under observation, until so far advanced that it is impossible to state definitely what was the condition of the ovary at the commencement of the malignant process. In a general way, however, it may be stated that those cases, in which the specimen is very hard and indurated, are more apt to have been primarily malignant, while those specimens which are very cystic with comparatively thin walls, are more likely to have originated as a benign cyst. The prognosis is probably rather more favourable in the later class of cases than in the former. In the 63 cases of ovarian tumours operated on there were 10 cases of malignant disease, giving a percentage of a little over 15·8.

All the specimens from the above were subjected to a rigid microscopical examination, at least two, and in some cases as many as ten or twelve blocks being taken from each tumour. In a large number of the cases a positive diagnosis could not have been given without the aid of the microscope, and in two cases malignancy was not even suspected until a histological examination had been made. The author states that it is difficult to state positively how many of these ten cases were originally benign, and how many were originally malignant, but from a careful study of the histories and of the specimens, he is of opinion that probably four were primarily malignant, and four were cases of carcinomatous degeneration of an originally benign ovarian cyst, in two cases the type of the original growth being in doubt. The age of the ten patients varied from 22 to 68 years, the average being a little over 46. Two of the patients were under 30 years, showing that this condition not infrequently occurs in young women.

There was an operative mortality of 10 per cent., the one death occurring in a case that was already septic before the operation, and in which the general condition was very bad. The patient died from peritonitis at the end of 36 hours. Norris very justly points out that in any larger series of cases the operative mortality would probably be considerably larger than his, and quotes statistics from Cohn, who returns a mortality of 20 per cent., and Kratzenstein one of 28 per cent. each from a series of 100 cases of malignant disease of the ovaries. Of the ten cases, nine were adenocarcinoma glandulare cysticum ovarii, and one adenocarcinoma papillare ovarii. With regard to papilloma of the ovaries, Norris found 13 cases of this condition in the 63 ovarian tumours, one only being both clinically and histologically malignant. But he lays stress on the fact that a papilloma of the ovary may be benign and yet present the gross appearances of malignancy at the operation, and so every effort should be made to remove the growth, even though it is thought to be malignant.

In examining the reports of any series of operations for papilloma of the ovaries, it will be found that there are many cases in which the primary growth is removed, but contact growths on the peritoneum have been left, and that these cases have recovered and had no recurrences.

Regarding the question of operative interference, the author thinks that there can be no doubt that all cases of malignant disease of the ovaries in which the entire growth can be removed should be submitted to operation, but he acknowledges that a difference of opinion may arise in deciding the so-called "border-line" cases in which it is doubtful if the entire growth can be taken away. These border-line cases, when of carcinomatous origin, almost certainly die either from the effects of the operation, or more frequently from a recurrence of the original growth; on the other hand when they are of papillomatous origin, they usually recover, and the fact that a diagnosis between these two conditions before operating is frequently not possible should lead the surgeon to operate on these cases, and so give the patient every possible chance. The author comes to the following conclusions as regards malignancy as a complication of ovarian tumours:—

(1) That one in every four to six cases of tumour of the ovaries is malignant, and that this proportion is sufficient to warrant the treatment of all cases of ovarian tumours as malignant until proved otherwise.

(2) That carcinoma is by far the most frequent and most dangerous of the malignant diseases of the ovaries.

(3) That every case of ovarian tumour should be operated on at once unless there is some strong contra-indication for the same.

(4) That the so-called "border-line" cases should be operated on, because the case may present all the clinical evidences of malignancy, and upon operation be found benign, or the gross specimen may even, together with the clinical symptoms, appear malignant, and on histological examination prove innocent; this is specially true of adenopapillomata, which

frequently and clinically so closely resemble adenocarcinomatous papilloma.

(5) That an exploratory laparotomy and the removal of ascites will make many cases more comfortable, and should certainly be performed when there is any doubt as to the absolute diagnosis of malignancy.

(6) That all ovarian tumours should be subjected to a rigid microscopical examination, and in cases in which there is any doubt as to the character of the tumour, a large number of sections should be taken, and that this routine probably in part accounts for the high percentage of malignancy occurring in the series of ovarian tumours reported.

(7) That the operative mortality for malignant tumours of the ovary should certainly be under 10 or 15 per cent., and that early diagnosis and immediate operation on all new growths of the ovary will greatly reduce this proportion.

B.—FALLOPIAN TUBE.

Ectopic Gestation, with special reference to the Treatment of Tubal Rupture.—The object of Hunter Robb's[8] paper on this subject is to consider the treatment of those patients who are found in a state of collapse following the rupture of an ectopic gestation. He is in agreement with most observers that immediate operation is called for in early cases of ectopic gestation, in which a positive or highly probable diagnosis can be made before rupture or any severe hæmorrhage has occurred, but that in the former class of cases he is not in favour of immediate operation. He expresses scepticism as to a woman's bleeding to death from a ruptured tube, believing that the hæmorrhage will stop of itself when the patient is sufficiently exsanguinated. He thinks that other factors over and above the actual loss of blood play the main part in the fatal termination in such a case.

After discussing the opinions of various recognised authorities on the treatment in question, he summarises their views thus:—

"It is generally taught that in cases of tubal rupture in the early months of ectopic gestation death is almost invariably due to the hæmorrhage that takes place, and accordingly the majority of surgeons advocate opening the abdomen as soon as possible, and ligaturing the bleeding vessels. If the total number of deaths could be known that have followed immediate operation for tubal rupture, it would be found to be a considerable one; particularly is this the case in the country or in other places removed from the skill of the expert. Therefore, when surgeons advise that all such cases should be operated upon immediately, it is easily seen why the treatment might be almost as dangerous as the pathological condition. Naturally, the physician in charge of such a patient would feel that an operation must be done at once, and that he must do it. Very often such a man has had little or no experience with the performing of an abdominal operation. In these circumstances the patient's life might be sacrificed simply from the shock of the operation alone or from the introduction of infection."

Robb, however, as the result of his experience founded on the clinical observation of 20 cases and on experimental work, totally dissents from this teaching, and feels positive that the fatal result due to the loss of blood alone is exceptional, believing that in the great majority of cases the active bleeding has ceased when one is called to see a patient who is suffering from a tubal rupture. The method of treatment adopted by Robb in all cases of ruptured ectopic gestation is that if there are any signs of improvement in the patient's condition (and this, in his experience, always takes place) the patient is kept under further observation, and in the meanwhile is carefully stimulated by means of saline infusions under the breast, and in some cases also by means of hot saline enemata, and by hypodermic injections of strychnine $\frac{1}{30}$th to $\frac{1}{10}$th of a grain every hour *p.r.n.* An injection of morphia is given if there is much pain and restlessness, heat is applied to the body and the end of the bed is slightly raised. While this treatment is being carried out the operating room is being prepared so that it can be used at a moment's notice. Of the 20 cases, three patients were operated on as early as the day after admission, the remainder at periods varying from three to twelve days afterwards, the average being five days. In five of the patients the condition was regarded as serious and contra-indicated immediate surgical interference. None of the remaining 15 exhibited symptoms that called for immediate operation. These cases included 2 of unruptured tubal pregnancy, 4 of tubal abortion, 1 of ovarian pregnancy, and 4 which were diagnosed as pelvic hæmatocele. There was 1 death, which was due to volvulus and intestinal adhesions on the tenth day.

Robb conducted a series of experiments upon dogs, 13 in all, of varying degrees of severity, from cutting the ovarian and uterine arteries, either or both, to total ablation of the internal genitalia. In one animal the oviduct, containing four fœtal sacs, was deliberately torn through. Notwithstanding the severity of these operations, all the animals rapidly recovered, with the exception of one, which succumbed during the course of a second operation.

Robb admits that these experiments show that the dog can evidently withstand a greater loss of blood than the human being, but, even admitting the difference in resistance, he considers that by cutting both uterine arteries, and in some instances both ovarians as well, the dogs were subjected to a risk of bleeding to death as great as that incurred by the average woman suffering from a ruptured tubal pregnancy. Therefore he feels justified more and more in believing that the internal abdominal hæmorrhage, such as is met with in a woman in a state of collapse from a ruptured ectopic gestation, is not sufficient in itself to cause a fatal termination in these cases, but that too early interference may be the determining factor in turning the scales against the patient's chance of recovery.

C.—URETHRA.

Taussig[9] conducted a series of examinations on the urethral secretions in order to investigate the relationship of the urethral bacteria to the production of catheter cystitis in women.

With this object in view, he made bacteriological examinations of the urethral secretions in 45 women free from any disease of the urinary tract or acute pelvic inflammation. The material was obtained by placing the patient on a table with the thighs separated, and while an assistant held the labia apart, the urethral meatus was dried with a piece of sterile wool, and a platinum loop passed into the urethra, special care being taken to avoid contact with the edges of the meatus. The loop was passed into the urethra for ½ c.m. and gently rubbed against the walls of the urethra. The material thus obtained was inoculated upon fluid and poured into a Petrie dish. There was no appreciable difference obtained in the results by using a bivalve speculum in order to avoid contact with the external meatus. He came to the following conclusions as the result of his investigations :—

(1) The normal healthy urethra is sterile only in a small proportion of cases, being sterile only 8 times out of 45.

(2) The pathogenic bacteria present reached as high a proportion as 62·5 per cent. in the series, the staphylococcus pyogenes albus being the most commonly found. The occurrence of the colon bacillus seems variable, having been isolated only three times. It is found most frequently when patients are confined to bed.

(3) That these urethral bacteria are actually carried into the bladder by catheterization is shown by the result of eight examinations in which the urethral secretion was first obtained in the usual way, and then a sterilised catheter was passed into the bladder and the first 10 c.c. of urine caught in a sterile test tube.

In 6 out of 8 cases, the bacteria found in the urine were identical with those found in the urethra; in the two remaining cases both urine and urethra were sterile. The assumption, therefore, that if there are pathogenic organisms in the urethra, these are of necessity carried by the catheter into the bladder seems confirmed by actual bacteriological tests. Urethral germs it would seem, however, may occasionally ascend into the bladder spontaneously. Reymond found the B. coli in the urine of seven women suffering from cystitis in whom no catheter had been passed, and Baisch too has seen cases which he assumes were due to spontaneous infection, and favours this explanation as against the view that the infection is due to a migration of germs from the rectum into the bladder.

(4) Irrigation of the urethra with boric acid, before passing a catheter, removes a large proportion of the urethral bacteria, but when their number is large, it does not suffice to remove them all.

(5) The double catheters devised for the purpose of avoiding

contamination with the urethral mucous membrane do not as yet deserve to be generally used. At the best they may be effective in reducing the number of organisms introduced into the bladder, but are far from providing a sure means of sterile catheterization.

(6) Wherever repeated catheterization becomes necessary, Taussig advises that the ordinary sterilised glass catheter be passed half way, and the urethra irrigated with half a pint of boric acid solution, care being taken that the fluid does not enter the bladder.

The catheter is then passed on into the bladder, the urine drawn off and the bladder irrigated with one or two pints or more of boric acid solution. Urotropin or some allied product should be given internally.

These precautions, the author points out, may be troublesome, but laboratory experiments and clinical experiences have shown that herein lies the only trustworthy prophylaxis against the production of catheter cystitis.

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TREATMENT OF TRACHOMA.

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THE treatment of trachoma may be divided into four stages:—(1) The treatment of the early condition; (2) the swollen and thickened stage; (3) the chronic stage; and (4) the treatment of the remote effects.

In its early stages, trachoma may manifest itself by producing considerable inflammation of the conjunctiva, accompanied by much muco-purulent discharge and photophobia; but, on the other hand, its onset may be insidious, and cause the patient only slight inconvenience. In these latter circumstances, it is not surprising that many cases receive ineffectual treatment or none at all. If, however, the patient seeks relief early, and a diagnosis of trachoma can be made with certainty, the probability of a successful recovery is undoubtedly increased. In the early stage, then, when the palpebral conjunctiva alone is affected, the cornea remaining clear, and no ulceration present, the trachoma bodies should be directly attacked by copper sulphate, preferably in solution (5 to 10 grs. ad ℥i.). The upper lid should be everted, and the copper applied directly to the retro-tarsal fold. The conjunctival sac should be thoroughly washed out, and a simple ointment used to prevent the edges of the lids from sticking together during sleep. This treatment ought to be carried out thoroughly twice daily. The patient should be isolated, and removed if possible into the country; and, in any case, from the influence of smoky, dusty town. Where possible the refraction must be tested, and, if any error exists, it should be corrected. The eyes ought to be protected from all strong light by means of tinted glasses, and the general well being of the patient maintained by plenty of fresh air, good food, and the avoidance of all alcoholic liquors. In this way an attack of trachoma may in some rare instances be terminated early, but unfortunately it is not the general rule, because the diagnosis is seldom made sufficiently early, and patients usually present themselves for treatment at a later period.

In the second stage, the patient complains of pain and discomfort, hotness and itchiness of the eyes; the lids are swollen and thickened, light is not easily tolerated, vision is obscured by discharge, and there is some constitutional disturbance. Sometimes small superficial ulcers are present in the cornea, and usually there is irritation of the iris, if not actual iritis.

The most satisfactory treatment is a weak silver nitrate solution (1 to 2 grs. ad ℥i.); this should be used three or four times daily after the conjunctival sac has been thoroughly washed out with one of the following lotions:—Perchloride of mercury, formaline, or chinosol, of a strength of 1 in 10,000 parts of water. A large shade may be ordered to protect the patient's eyes from an excess of light, or a pair of dark protecting glasses worn. The patient, or his friends, must be warned of the possibility that the malady might affect others, and the greatest care ought to be taken to prevent this. Towels, handkerchiefs, or other material used to wipe the eyes must not be used by anyone except the patient, and the same applies to the sheets and pillow cases; also no one should use any water for washing purposes which has been used by the patient; the safest plan being, where possible, that the patient should wash in running water.

In order to wash out the conjunctival sacs, it is best to place the patient in a chair with his head well thrown back, or, better still, lying on a couch or table. Have the lotion ready mixed with warm water in a basin beside you; into this put some pledgets of absorbent cotton-wool. In addition, a large piece of dry absorbent cotton-wool will be needed, which should be held against the patient's cheek to absorb the lotion as it escapes from between the eyelids. Press this gently against the cheek with the third and fourth fingers of the hand, leaving the thumb and first finger free to hold the lids apart. Take in the free hand, one of the soaked pledgets of wool, hold it over the inner canthus, allowing the lotion to run from it through the parted lids to the external canthus, from whence it will be absorbed by the dry cotton-wool on the cheek. Continue this flushing of the conjunctival sac for 2 to 3 minutes, constantly moving the lids so as to ensure that the lotion will reach the upper fornices of the conjunctival sac.

It being sometimes more difficult to deal with children, the following hints may be valuable. After thoroughly cleansing the outside of the lids, allow some of the lotion to remain over the inner canthus in a little pool. Then, the child being on its back, when persuaded to open its eyes, some portion of the lotion must of necessity enter the conjunctival sac, and so make it unnecessary for the operator to keep the lids apart himself.

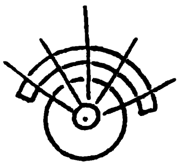
After the eyes have been thoroughly washed out, a small portion of the ointment should be placed within the conjunctival sac. The washing of the eyes should be repeated every two or three hours, according to the amount of the discharge present, all wool used should be immediately burnt or destroyed.

With regard to some of the special symptoms, if severe pain is complained of, a 1 per cent. solution of dionine should be employed, and will afford relief; cocaine is contra-indicated on account of its softening effect upon the epithelium of the cornea. For the constitutional condition, a sharp purge, followed by a tonic, is advisable. When the ulcers caused by the roughened lids are numerous or severe, it is sometimes necessary to stop treating the trachomatous condition directly, and to substitute soothing treatment. The Ung. Hyd. Ox. Flav. with Atropine and weak antiseptic lotions should be used. When the ulceration has subsided the treatment of the trachoma may be resumed.

The acute stage lasts, as a rule, from a week to ten days, and, at the end of this time, the discharge will have diminished, the conjunctiva will be less swollen and œdematous, and the intolerance of light less marked. It is at this point that the diagnosis can be made with certainty. On everting the upper lid, the typical trachoma bodies may be observed, and the conjunctiva will have a swollen and gelatinous appearance; careful inspection will also reveal the presence of fine vessels pushing their way into the corneal area from the upper part of the scleral margin (Pannus). Continue painting the conjunctiva with a solution of silver nitrate, but now using a stronger one (2 per cent.); to do this roll some cotton-wool on a probe or a wooden match, soak it in the solution and apply it gently, the cotton-wool should be destroyed after use. Following the application of the solution, the conjunctiva must be washed out with boric lotion or normal saline solution in order to remove all excess of the silver salt. In this, the second stage, we find the condition most marked which led to the name trachoma, viz., a roughness of the inner surface of the lid. The pathological change present here is due to the formation of adenoid tissue, and also to an increase of the stroma of the conjunctiva. The so-called trachoma bodies are really masses of adenoid tissue, separated by bands of fibrous tissue, so that at one time we have the adenoid condition most marked, in which case the conjunctiva is thickened but soft; and later on, cicatrisation sets in and the follicles become harder, and the conjunctiva less thick. This hardness of the mucous membrane of the lids, together with the unevenness, produced by the contracting follicles, causes the inner surface of the lids to become rough, like a nutmeg grater. The constant friction between these roughened lids and the cornea leads to the condition known as pannus, and may be so severe as to cause actual ulceration of the cornea itself, resulting in that distressing loss of vision, which is the worst consequence of the disease. When the lids are thick, and the trachoma bodies large and succulent, a very successful method of treatment consists in expressing the trachoma bodies by means of roller forceps. The upper lid should be everted, and one blade of the forceps inserted between the globe and the upper part of the lid, the other blade remaining outside, and pressure should be used sufficient to rupture the follicles, but not to tear the conjunctiva. When all the follicles have been expressed, the surface should be painted with a strong solution of Hyd. Perchlor. (1–500). This treatment must be carried out under an anæsthetic, and generally results in a violent inflammation of the conjunctiva lasting a week or more, but, when the reaction subsides, it is found that the conjunctival surface is much smoother and the symptoms less distressing. The application then of solid copper sulphate or alum stick must be started and continued until the roughness has disappeared. In some clinics, instead of roller forceps being used, the swollen and enlarged trachoma bodies are scarified by a sharp needle, a Graefe knife, thorns, prickly leaves or any convenient instrument for rupturing the follicle, and then powdered boric acid is rubbed into the lacerated surface with the finger. The principle is the same, viz., the opening of the trachoma follicles, and the application of some strong antiseptic and astringent remedy.

The chronic stage now supervenes and is the most difficult to treat, it being the longest in point of duration; also during it, the patient is liable to more or less frequent attacks of acute inflammation. These exacerbations are in all probability due to secondary infections, since, in all these cases, any of the organisms which are usually found in the conjunctival sac may be cultivated from the discharge. The marked redness of the eye, which appears almost immediately, is due to the engorgement of previously existing vascular channels. The vessels that exist in the condition of pannus may, on the improvement of the condition, cease to contain any blood, they nevertheless remain patent, ready to be filled at any subsequent time; it is therefore often very useful to perform the operation of peritony, as we may, by that means, clamp the vessels, and so induce their atrophy. Pannus is a condition of new growth, formed by the pushing forwards of vascular areolar tissue between the corneal epithelium and the corneal tissue proper. It usually exists when the surface of the lid is rough and hard, and is generally co-extensive with the conjunctiva of the upper lid as far as the lower margin. If we examine pannus with a magnifying glass, we can focus innumerable vessels in the upper superficial part of the cornea; these vessels, when the acute inflammation has subsided, may still be seen as shrivelled, grey, branching lines, *in situ*, and it only requires a recurrence of the acute inflammation to once again open them out.

If then, during a period of quiescence, an incision is made, about 2 or 3 millimetres posterior to the scleral margin and concentric with it, embracing the whole area involved by the pannus, and a narrow band of the conjunctiva, together with the sub-conjunctival tissue, is removed, these vessels will all be cut across, and a portion of their length removed. If now the wound is allowed to cicatrise up, a bar of scar tissue is formed which, by its contraction, occludes the channel; it will be seen that the result will be the atrophy of the distal portion of the vessels.



The most important consequences of trachoma are opacities of the cornea, and cicatrisation of the conjunctiva. The former are unfortunately usually central, and greatly interfere with vision; they are also diffuse, and an iridectomy is seldom of any value. With regard to this point my experience is, that a careful inspection with a magnifying glass, the pupil being dilated, and a good light brought to bear on it, often reveals fine corneal opacities which to the naked eye are invisible; irregular refraction will also be visible with a retinoscopic mirror. The only cases, in which an iridectomy is of real value, are those in which the opacity has a distinct line of demarcation, the rest of the cornea being perfectly clear. In all other cases, the "stop" action of the iris is so valuable that iridectomy cannot fail to aggravate the patient's condition. The opacities then must be attacked directly. In so far as the opacity is due to the presence of organised fibrous tissue, the result of ulceration of the cornea, the chances of improving the condition are small; but undoubtedly a certain amount of the opacity is due to inflammatory products which may be absorbed, and the best means for obtaining this result is to keep up a slight irritation of the eye by means of stimulating medicaments, such as sulphate of copper, sulphate of zinc, yellow oxide of mercury, dionine, etc.; the first two being best applied in the form of drops, 1—4 grains to the oz., two or three times a day; the mercury as an ointment, and the dionine as drops of 5-10 or even 15 per cent. applied once or twice a week. This latter drug, in these strengths, produces a marked œdema of the conjunctival tissue, due to a dilatation of the lymphatics; by this means absorption is increased.

A method of treating dense opacities, by producing serious and violent inflammation by means of jequiritol, has been in vogue for years, but its efficacy is adversely criticised by some; undoubtedly fibrous tissue may undergo softening and absorption, as the result of the changes following acute inflammation, but the treatment may of course lead to serious results and should not be undertaken "unadvisedly, lightly, or wantonly." My experience is, however, that in suitable cases it is distinctly useful.

Fibrolysm, which is a combination of thiosinamin and sodium salicylate, is reported to have been of value in softening scar tissue, by being injected into the glutin, but I have no experience of it, and others have reported its inutility.

The photophobia, which is especially noticed in these cases of trachoma with corneal opacities, when the patient goes into a bright light, is very much relieved by smoke glasses. No. 1 or 2 neutral or blue tint.

Shrinking of the conjunctiva and entropion are the two most common results of the cicatrisation consequent on trachoma. If the former is only slight, and does not limit the movement of the globes too much, it need not be treated; if, on the other hand, the shrinking is so great that the globe cannot be moved, and pain is felt at each attempted movement, then the transplanting of mucous membrane from the mouth, or elsewhere, may become necessary. Thiersch's method of grafting I have found useful. The graft takes on the characteristics of the conjunctival mucous membrane in course of time, and the tissue adds to the shrunken conjunctiva, thus relieving the restricted movements of the globe. Owing to the excellent blood-supply, the grafts usually live, when placed in the sac, but the results are often disappointing, owing to the shrinking of the graft; quite a large piece of skin often contracts to very moderate dimensions in a short time. The actual technique need not be considered here, as it is described in any text-book treating of the subject.

Entropion, or inversion of the lids, may affect either lid, but entropion of the upper lid is more common; the first result of this inversion is the displacement of the lashes, so that they are directed straight downwards instead of down and forwards; a little later they become directed inwards, and then are a constant source of trouble to the patient; the constant rubbing of the cornea by the lashes leads to a chronic local superficial keratitis if the lash is long and soft, and, if short and hard, to an ulcer. In either case, the cornea is rendered opaque, the patient is constantly worried, the eye is kept in a chronically inflamed condition and life rendered miserable. The removal of the lashes by means of epilation forceps gives instant and temporary relief, but, in a short time, the lash grows again and the same train of symptoms recurs. It has been proposed to destroy the roots of the lashes by means of the galvano cautery, or to entirely remove the edges of the lids, and numerous other methods have been advocated, but I have found that a plastic operation, slightly modified from that first described by Snellen, meets these cases most satisfactorily. In one or two instances, I have had to repeat the operation five or seven years later, but as it is not a serious one, and the relief is greatly appreciated, the patient has always been willing to undergo it a second time. The operation may be done under a general anæsthetic, or by means of subcutaneous injections of cocaine into the margin of the lid. An incision is then made through the skin of the lid, about three millimetres from its edge, parallel to it, and extending its whole length. The muscle is exposed and a portion corresponding to the gaping wound entirely removed, the tarsal plate being exposed. A wedge-shaped piece of the tarsus should now be removed, the apex of the wedge being towards but not involving the conjunctiva; the wedge of tarsus should also be as long as the wound, or as long as possible. The operation is completed by passing a fine stitch through the skin and muscle of the lower edge of the wound not including the tarsus; then carry it through the upper edge of the tarsal plate, not through the skin, and so approximate the skin of the lower edge to the tarsus of the upper edge.

Other methods have been advocated, and may be as useful, but I have found the small operation described here meet all the cases that have come under my care.

The entropion of the lower lid is best treated by removing a portion of the skin from it, together with the underlying muscle; the removal of the skin alone is no use; but the lower lid is not usually a cause of trouble in trachoma.

In Germany, especially in the north-eastern parts, where very much attention has been given to this disease, Kuhnt's method of removing the whole of the affected portion of the retrotarsal folds, during the early stage of trachoma, has been adopted. Kuhnt claims to cure these cases in from one to three months (vide *Ophthalmic Record,* October 1905), but this method has not been extensively tried here; mainly because most of the London cases are imported from abroad, and are consequently not seen in the early stages; and those that are infected here would seem to be slighter than those treated by Dr. Kuhnt.

In conclusion, let me say that much of the distortion of the lids, etc., so often seen following trachoma, is rather the result of too vigorous treatment than of the disease itself. Treat your cases firmly, but not roughly, and continue the treatment persistently even after the patients seem to be cured.

REVIEW OF SOME RECENT LITERATURE ON DISEASES OF THE NERVOUS SYSTEM.

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ACUTE POLIOMYELITIS (INFANTILE PARALYSIS).

WITH a better understanding of the morbid anatomy of this disease, the term "infantile paralysis" gradually became, to a large extent, displaced by that of "acute anterior poliomyelitis;" while this latter, again, in its turn, has given way to the more comprehensive title of "acute poliomyelitis."

The first-mentioned term, viz., that of "infantile paralysis" or "infantile spinal paralysis," as it has been variously styled, is obviously too limited a designation, since the disease is by no means confined to childhood. This latter fact has been recently emphasised by Farquhar Buzzard in his Goulstonian Lectures on "Acute Infective or Toxic Conditions of the Nervous System,"[1] in which he shows that on taking at random, from literature, 25 undoubted acute examples of this disease, 15 cases occurred under and 10 over the age of 20. These figures, as he states, are calculated somewhat to surprise those who are in the habit of regarding this affection only as one of early childhood.

From observations of epidemics and of the general symptoms which accompany an attack, the infective nature of acute poliomyelitis has long been suspected, though the exact nature of the infective agent or agents has hitherto been, and still is, a matter of great uncertainty.

An important addition to the bacteriological aspect of the question has lately been made in a paper embodying an account of some investigations carried on at the Middlesex Hospital by Dr. W. Pasteur, Mr. A. G. R. Foulerton, and Mr. H. MacCormac, in which a case of acute poliomyelitis was found to be associated with a diplococcal infection of the spinal sac.[1] The symptoms and progress oi the case, which was that of a boy aged 13 years, were, from a clinical point of view, in accordance with the recognised features of acute poliomyelitis, though there were some points especially worthy of notice, as, for instance, the paralysis of the diaphragm and of many muscles of the trunk. For a time the patient seemed in great danger of losing his life, but the subsidence of fever was followed by a general improvement in health, and, later on, by some degree of recovery of power, though the patient remains entirely crippled so far as any use in the lower limbs is concerned.

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[1] *Brain*, 1907, No. 117.

Bacteriological Examination of the Cerebro-spinal Fluid.—Four specimens of the cerebro-spinal fluid were obtained from this case. When withdrawn the fluid looked quite clear, but, after standing a little while, greyish sediment collected which, on microscopical examination, proved to consist of lymphocytes. After centrifugalising the fluid, a further examination showed that these deposits consisted entirely of mononuclear cells, and that there were no polymorphonuclear leucocytes to be seen, and, in this respect, the writers point out that their results resemble those obtained by Geirsvold in 12 cases, taken from an epidemic of acute poliomyelitis which occurred in Norway in 1905.

In most of the cover-glass preparations, made from the two earlier specimens of fluid, a few widely scattered diplococci could be distinguished. In a few instances two pairs were grouped as tetrads. There was some indication of a capsule, but this was not so distinct as it was with the diplococci which were found in the cerebro-spinal fluid of rabbits.

The diplococci were always found free in the fluid; no intracellular forms occurred. No culture of this diplococcus on artificial media could be obtained; media of every description were inoculated with the fluid, and incubated both aerobically and anaerobically, but in no instance was growth of any kind obtained.

Rabbits were inoculated intracranially with the fluid, and, in three instances, the diplococcus was found in the cerebro-spinal fluid on the 22nd, 50th, and 53rd days after injection and, in two of these instances, the rabbits became partially paralysed on the 52nd and 49th days after inoculation. Unfortunately no complete histological examination of the cords of these paralysed rabbits was made.

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[1] *Lancet*, February 15, 1908.

In summing up the evidence concerning the infective nature of acute poliomyelitis, these authors consider that Geirsvold's investigations show that a specific disease exists of which acute poliomyelitis is a frequent and prominent, though not essential, feature, and they consider that the instance they have recorded represents a sporadic case of the disease of which Geirsvold observed an epidemic.

They do not, however, consider that there is sufficient evidence to assume that acute poliomyelitis is always the result of a particular diplococcus infection, but rather lean to the view that the symptoms may be produced by toxins of various natures, and, in support of this, they quote Trevelyan's [1] observations on cases which followed immediately on such different infections as those of measles, typhoid fever, and acute rheumatic fever.

NERVOUS MANIFESTATIONS OF ARTERIO-SCLEROSIS.

The effects of arterio-sclerosis are so frequently those of diminished function of the nervous system that it will be interesting to give an abstract of a recent contribution on the subject by Alfred Stengel.[2]

In his opening remarks, Stengel recalls the fact that persons suffering from arterio-sclerosis usually have some form of structural disease of other organs, such as the kidneys, heart, or brain, and that it is important to differentiate the symptoms of these independent changes from those arising from arterio-sclerosis proper. In order to discuss the matter more clearly he considers, first, the certain results of vascular occlusion and disease, and, second, the symptoms which, from their analogy, may fairly be attributed to similar conditions:—

1. Symptoms associated with obstruction of peripheral vessels.

Sudden occlusion or obstruction of one of the larger peripheral arteries is followed by an immediate attack of violent pain, and, usually, loss of power in the part which the obstructed vessel supplies.

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[1] *British Journal of Children's Diseases*, April, 1906.

[2] *American Journal of the Medical Sciences*, February, 1908.

After a time the intensity of the pain diminishes, and is replaced by more continuous sensations of an aching character. The degree to which power is lost may be partial or complete, according to the size and range of the vessel affected.

In addition to these two main symptoms of pain and paralysis, there may be others, *e.g.*, pallor, coldness, tingling, cramps, and œdema, and the pulse in the affected limb may be weakened or abolished. Finally, unless a collateral circulation is established, gangrene will occur.

2. Painful sensations preceding Senile and Diabetic gangrene.

In these cases, Stengel points out that vascular obstruction is less sudden and less complete than in the group that has just been mentioned, and though it is generally accepted that arterio-sclerosis is the prominent feature of these examples, it is briefly shown that the symptoms are, in all probability, the *direct* result of the arterial changes.

3. Pains and other nervous symptoms in the extremities less certainly attributable to arterio-sclerosis.

Under this heading, Stengel discusses that interesting and often troublesome group of cases in which numbness, tingling, burning, and other symptoms, frequently known collectively as "acroparæsthesia," occur in elderly persons who have different degrees of arterio-sclerosis. In some cases it can be observed that the severity of the symptoms bears a definite relation to the degree of arterio-sclerosis, and in others the symptoms vary as the strength of the heart increases or decreases the force of the circulation. Stengel then passes on to a second division of this group, viz.: cases in which the symptoms suggest the presence of reflex vasomotor spasms, *e.g.*, erythromelalgia, Raynaud's disease, and intermittent claudication,—all of which may occur in people who have more or less pronounced arterial disease. In erythromelalgia and Raynaud's disease it is suggested that the reflex disturbances, which seem to play such an important part, may arise from the diseased arteries. In intermittent claudication the cause is generally attributed directly to arterio-sclerosis of the peripheral vessels, though Dejerine, Sollier, and others have described cases of a similar nature in which the morbid anatomical changes have apparently been those of anæmia of the cord following sclerosis of the spinal vessels.

4. Abdominal pains in association with arterio-sclerosis.

While it is generally known that sudden obstruction of the abdominal aorta produces intense pain, Stengel thinks that it is not sufficiently recognised that paroxysms of pain may arise from a sclerosed vessel, and he considers that some cases of backache may be caused in this way.

5. Pain in arterio-sclerosis of the thoracic aorta.

A pain, differing from that of angina in its wider distribution, is apt to follow muscular exertion when there is degeneration of the thoracic aorta.

6. Cerebral manifestations of arterio-sclerosis.

In cerebral arterio-sclerosis, many symptoms are apt to be produced by partial blocking of larger vessels, or by complete thrombosis of the finer branches. Convulsions may occur which can be attributed to no other cause than arterio-sclerosis, and it is interesting to speculate to what extent spasm of the cerebral vessels may take a part in such cases.

Other cerebral symptoms that may occur in association with the diseased vessels are stupor, coma, vertigo, tinnitus, ocular disturbances, and psychic manifestations.

"NERVE DISASSOCIATION. A NEW METHOD FOR THE SURGICAL RELIEF OF CERTAIN PAINFUL OR PARALYTIC AFFECTIONS OF THE NERVE TRUNKS."[1]

Under the title quoted above is an interesting account, by W. Wayne Babcock, of a method which he has adopted in treating certain forms of paralysis or paræsthesia, due to injury or inflammation of nerve trunks, by freely opening the nerve sheath, disassociating the component fibres, and isolating the nerve from compressions of fibrous tissue.

As an example of the influence of pressure within the nerve sheath as a cause of palsy and anæsthesia, the case of a man, who had suffered an injury of the median nerve from a piece of glass, is recorded.

On exploring the nerve, a marked fusiform enlargement was found in its course, and incision of this area was followed by a flow of gelatinous and serous fluid from between the nerve fibres. Nothing more was done except the making of a free longitudinal incision into the nerve. Improvement took place very promptly and after four days there was marked decrease of anæsthesia and increase of power.

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[1] *Annals of Surgery*, November, 1907.

The rapid improvement in this instance led to the development of the method of treating certain forms of neuritis, and also of possibly inducing regeneration along nerve-paths blocked by areas of cicatricial tissue.

The technique of the operation is fully explained, and, in the main, it consists in exposing and isolating the affected nerve, and then making a free longitudinal incision into its sheath. The nerve trunk is then lifted, held taut, and the fibres carefully separated from one another by means of a small tenotome, at the same time taking as much care as possible not to divide the fibres. The nerve is thus transformed from a rounded cord to a flat ribbon-like band of separated fibres, and, if cicatricial tissue is met with, the separation of the fibres is prolonged along straight lines dividing the scar into multiple parallel threads of tissue.

If the nerve trunk has been previously embedded in connective tissue, it should be freed from this and, if necessary, isolated by the interposition of adipose tissue, strips of which can generally be obtained from beneath the skin.

Out of seven cases, in which the author partially or thoroughly disassociated nerve fibres, an increase of paralysis following the operation was only observed in one, while in several the operation was quickly followed by some restoration of function in the affected nerve-field. The author gives particulars of four cases of neuritis which he has treated by this method, and finally arrives at the following conclusions:—

1. That the disassociation of nerve fibres may be carried out without producing gross evidence of reduction in the conducting power of the nerve.

2. Disassociation probably is not as apt to produce paralysis as thorough nerve-stretching.

3. That in certain cases of neuritis, nerve-disassociation is less dangerous and more potent in relieving symptoms than nerve-stretching.

4. In certain cases of motor paralysis following inflammation or injury of nerve trunks, disassociation may be followed by a remarkable and almost immediate return of some of the function.

5. In the treatment of certain forms of peripheral paralysis, due to interruption of nerve-paths by masses of fibrous or other tissue, the operation of nerve-disassociation, from its apparent safety and conservation, is deserving of trial.

THE NEW VIEWS ON APHASIA.

In the last review which I contributed to THE PRACTITIONER,[1] I gave a brief outline of the views which Marie had then recently brought forward concerning the mechanism of the production of aphasia, and the far-reaching importance of these views justifies allusion to other work which has since been recorded.

Briefly to recapitulate. Some of the main points of Marie's contention are:—

(1) That Brocas convolution has in itself nothing to do with the mechanism of speech.

(2) That in all cases of cortical aphasia there is some degree of impairment of the intelligence.

(3) That the zone of Wernicke, *i.e.*, an area comprising the angular gyrus, the supramarginal convolution, and the bases of the first two temporal lobes, is the centre for comprehension of language, and that lesions of this centre cause, in proportion to their extent, some impairment in the capacity of comprehending language.

(4) That there is only *one* form of cortical aphasia, viz., the aphasia of Wernicke, which is characterised by different degrees of defective intelligence, loss of power to read and write, but the power of speaking is still retained.

The loss of power to speak depends, not upon a lesion of Brocas convolution, but upon a lesion situated below the cortex in the region of the lenticular nucleus, and is represented by the term Anarthria, and thus, according to this, we have the morbid anatomy of aphasia limited, at any rate in the main, to cortical lesions of the area of Wernicke, and to subcortical lesions in the neighbourhood of the lenticular nucleus.

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[1] THE PRACTITIONER, October, 1907.

In the *Journal of Nervous and Mental Disease,*[1] Dercum records a case of aphasia, both "motor" and "sensory," with integrity of the left third frontal convolution, but with a lesion in the lenticular zone and inferior longitudinal fasciculus.

The patient was a man of about 65, who was admitted suffering from a right-sided hemiplegia with aphasia. The lower half of the right side of the face, the right arm, and the right leg were paralysed, and there were some contractures both in the arm and leg.

With regard to language, the patient was unable to understand what was said to him, his power of speech was but very slight, and then scarcely intelligible, and he could neither read nor write.

Finally, death occurred after another apoplectic seizure which affected the right side of the brain.

Post-mortem examination revealed two extensive lesions, an old one, on the left side of the brain, involving the lenticular zone and the inferior longitudinal fasciculus, and a recent one, on the right side of the brain, involving the basal ganglia and the capsule.

The recent lesion on the right side of the brain was the cause of death, while that on the left side, which involved the lenticular nucleus, the adjacent portion of the internal capsule, and extended along the inferior longitudinal fasciculus, was the cause of the long-standing right-sided hemiplegia and aphasia. The third frontal convolution and its subjacent white matter were absolutely intact, as also were the convolutions of the region of Wernicke and of the angular gyrus.

Dercum compares this interesting case with one described by Marie in the *Semaine Médicale* of May 23rd, 1906, and then proceeds to consider how a lesion, in the situation of that just described, could give rise both to the inability to speak and to the aphasia of Wernicke.

He considers that the inability to speak, *i.e.*, the anarthria, is easily explained, according to Marie's views, by the lesion of the lenticular zone, and it seems likely that the aphasia of Wernicke, *i.e.*, the inability to comprehend language, was produced by the isolation of the zone of Wernicke in consequence of the degeneration of the posterior longitudinal fasciculus.

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[1] November, 1907.

The same lesion, *i.e.*, the degeneration of the posterior longitudinal fasciculus, Dercum considers, also explains the presence of alexia, by cutting off all communications between the zone of Wernicke and the visual centres. Dercum further considers this case most interesting and suggestive with regard to the functions of the striated body, which, he points out, is a persistent structure throughout all vertebræ and in the lower vertebrates it constitutes the whole of the cerebrum. Even so high in the scale as in birds, the pallium, *i.e.*, the part corresponding to the cortex of man, is still very rudimentary, and in man the striated body has retained such a size that it cannot be looked upon as a rudimentary or vestigial organ. It is permissible, therefore, to infer that this body has important functions, and that it should be concerned in speech, Dercum thinks, is in no sense an inherent impossibility.

While not intending to compare the speech of a parrot with that of man, it is considered that the inference that the parrot talks with his striated body is justified by the facts.

In conclusion, Dercum states that the function of the lenticular nucleus appears to be one of co-ordination of complex muscular movements and, motor speech being pre-eminently a function requiring the co-ordination of complex movements, a derangement of the intricate co-ordination of necessity leads to anarthria, or absence of motor speech according to the amount of destruction that has taken place.

MAJOR OPERATIONS IN THE TREATMENT OF PUERPERAL SEPSIS.

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THE question of operative interference in the treatment of puerperal infections is one of much difficulty, and, at the same time, one of great practical importance. It, therefore, behoves the practitioner, who may at any time be called upon to treat a case of puerperal sepsis in its severer forms, to know what may be expected from this method of treatment, and under what conditions it may most successfully be applied.

It is only within the last decade or so that major operations have received serious consideration in the treatment of puerperal sepsis.

The various major operations, which have been performed for this condition, may be considered under three headings, namely:—I.—Hysterectomy; II.—Ligature of Pelvic Veins for Thrombosis; and III.—Abdominal or Vaginal Section for Puerperal Peritonitis.

I.—HYSTERECTOMY.

B. S. Schultze,[1] of Jena, was the first to remove the uterus on account of puerperal sepsis. This he did with success, in 1886, in a case of puerperal sepsis, due to retention of the placenta, which could not otherwise be removed. He, therefore, performed supra-vaginal hysterectomy by the method at that time in vogue, namely, by strangulation with an elastic ligature, supra-vaginal amputation, and extra-peritoneal treatment of the stump.

The next step was taken by Stahl,[2] who successfully removed the puerperal uterus for sepsis, arising in an infected submucous myoma.

In 1894, Sippel[3] performed abdominal hysterectomy for a case of septic uterus, in which there was no retention of the placenta, or infected tumour, but in which "septic endometritis" existed. Again the patient recovered.

Hysterectomy was now an established procedure in puerperal sepsis, for, as Sir William Sinclair[4] says, "it was probably the publication of Sippel's case, which set the example so eagerly followed the world over for a whole decade."

C. G. Cumston[5] considers that the question of hysterectomy for acute puerperal septicæmia is as yet far from settled. In order that it may become a legitimate operation, the uterus must be the seat of marked lesions, and form a serious danger to the patient. He classes puerperal lesions into three groups :—

1. The uterus alone presents marked lesions. In these cases, hysterectomy is distinctly indicated, especially if other lesions co-exist, *e.g.*, rupture of the uterus, irremovable adherent placenta, fibromata, or carcinoma.

2. Cases in which the uterus presents infectious lesions, but in which other lesions exist in the viscera, *e.g.*, spleen and lungs. Here the advisability of operation is extremely questionable, and is held by many to be contra-indicated.

3. Cases in which the uterus has only served as a way of entrance to the infection, and is free from any lesion. Here hysterectomy would be worthless.

In answer to the question : What is the ordinary condition of the uterus found in generalised puerperal septicæmia? Cumston has collected a formidable array of evidence to show that uterine abscess and purulent infiltration are more frequent than is generally admitted and than clinical evidence would lead one to suppose, and that, very frequently, extra-uterine lesions also co-exist, such as pelvic cellulitis, purulent infiltration of the broad ligaments, suppurative salpingitis, pelvic peritonitis, etc., all of which may need surgical interference. In gangrene of the uterus, the local lesions are absolutely characteristic.

Cumston concludes that there are certain cases of puerperal septicæmia, which might be saved by removal of the uterus, but, up to the present, there are no absolute clinical signs which will allow one to proceed with certainty. Taking all the symptoms carefully into consideration, and combining this with a careful intra-uterine examination, may lead to an indication for surgical interference after all other therapeutic procedures have failed. Acute septicæmia, on account of its rapid evolution, can never be benefited by hysterectomy, but, on the other hand, in cases of secondary septicæmia, with a slow evolution, hysterectomy is indicated. No useful indications can be drawn from a bacteriological examination of the lochia or blood, but a cytological examination of the blood furnishes excellent prognostic indications.

Boldt,[6] however, showed before the New York Obstetrical Society, a uterus which he had removed in a case of diffuse purulent peritonitis following criminal abortion five days previously. In addition to hysterectomy, the abdomen was also washed out with saline solution, and vaginal drainage was employed. The patient died next day.

At the same meeting, he also reported a case, in which he performed partial hysterectomy for puerperal sepsis, having resected the right uterine cornu with part of the uterine body, the broad ligament, and the appendages of the same side. This patient also died.

Cragin[7] states it to be his rule never to perform hysterectomy for puerperal infection, unless he can obtain evidence of a localisation of the inflammation with pus formation, either in the uterine wall, or in the appendages. He has operated on a number of cases of general suppurative peritonitis, the result of puerperal infection, but has never succeeded in saving a case.

Hysterectomy is placed in the background in the treatment of puerperal sepsis by von Rosthorn,[8] by whom it is only indicated in cases (1) in which a putrescent condition is present, as in carcinoma, or myoma, accompanying the puerperal condition; (2) with a complicating extensive tear of the uterus; (3) inversion or prolapse of the uterus; and (4) retention of decomposed products, which cannot be removed by the usual means. The vaginal route is recommended in all cases, except those complicated by carcinoma.

Haigh Ferguson[9] records the following case, in which he successfully removed the puerperal uterus for sepsis:—A vi-para, aged 25, had an easy labour, the midwife only arriving ten minutes before the child was born. Only two vaginal examinations were made, but there was considerable difficulty with the after-birth, which came away half an hour after the birth of the child. On the fourth day after the confinement, the patient had some pain in the right side, where she noticed a swelling. On the eleventh day, she was able to get up, and then went about her household duties for a week, though never feeling quite well. She then had a rigor with severe pain in the right side. The same day she was removed to hospital, as a case of general peritonitis. On examination under anæsthesia, three days later, a mass was felt which was provisionally diagnosed as a right pyosalpinx. Laparotomy was performed. In the upper part of the uterus was discovered a spot which presented the appearance of a gangrenous inflammation, especially over two very definite areas. The right Fallopian tube was in a condition of acute inflammation. The uterus was removed by supravaginal amputation, and vaginal drainage was accomplished by means of a rubber tube passing through the posterior fornix.

In his remarks on this case, Ferguson proceeds: "What I would plead for is that, in all cases of puerperal infection, which have resisted ordinary treatment, where the patient's condition is getting worse, where there is no cellulitic abscess which can be evacuated and drained through the vagina, or the abdomen, an abdominal section should be performed, and the subsequent procedure determined according to the condition found:—if general peritonitis, thorough washing out and vaginal drainage; if the uterus is affected as a focus, do a complete or partial hysterectomy, or remove a tubal or ovarian, combined also with vaginal drainage if necessary, and possibly with abdominal drainage as well. If the uterus is uniformly affected, it must be either completely removed or let alone. I feel convinced that some lives, otherwise hopeless, could be saved in this way. Hysterectomy one would regard as very exceptional treatment in puerperal cases, nevertheless there is a distinct, though restricted, field for its use. In opening the abdomen in puerperal peritonitis, one should always be prepared for a possible hysterectomy."

The latest contributor to this subject is Sir William J. Sinclair,[10] whose experience is limited to six cases. He is very unfavourably impressed with the operation. In one case only had he the opportunity of early intervention, and that was the only case in six which ended favourably. He believes his experience to have been similar to that of other operators in Great Britain—whether their cases have been recorded or not—viz., that the cases have come under observation much too late. He concludes that although in a very small number of the most serious complicated cases the best treatment may still be vaginal hysterectomy, yet the general opinion of obstetric surgeons is steadily growing in favour of other operations, namely, (1) ligature of the thrombosed veins, with or without clearing out the contained thrombus, and (2) abdominal section and drainage in the treatment of acute puerperal peritonitis.

II.—LIGATURE OF THROMBOSED PELVIC VEINS.

In the pyæmic form of puerperal fever, infection spreads to the pelvic veins, which become inflamed and thrombosed, dissemination of the infected thrombi giving rise to pyæmia. It was accordingly considered probable that ligature of these veins and their excision, or at least, clearing out of their contents, might cure the disease.

This method was first suggested by Sippel,[11] as early as 1894, and was first actually put into practice by Freund[12] of Strasburg in 1897. In that year he ligatured the thrombosed vena spermatica interna in two cases, removing the veins and their contents.

Trendelenburg,[13] in 1902, reasoning from the analogy of the surgical treatment of sinus thrombosis, operated in cases of thrombosis of the pelvic veins, reaching the affected vessels by an extra-peritoneal route. He was unsuccessful in four acute cases, but managed to save the patient in one case of chronic pyæmia. Trendelenburg insists on the necessity of early operation.

Bumm,[14] in 1905, brought this subject into prominence. He drew attention to the rapid spread of the poison from the infected endometrium by way of the venous system. The streptococci (the most common and virulent causative microorganism) may be carried in various directions. Virulent forms are soon carried by the blood-stream to the uterine and ovarian plexuses, and to the hypogastric veins, then into the iliac veins, the femorals, and the inferior vena cava. Such septic phlebitis with infected areas and thromboses soon gives rise to acute pyæmia. The chills begin in the end of the first, or beginning of the second week of the puerperal period. The phlebitic process may begin in the uterine wall, or in the broad ligaments, and then extend to the peritoneum.

If the streptococci are only slightly virulent, the poison spreads more slowly ; there is less tendency to pus formation, but inflammation occurs, and phlegmasia alba dolens, or phlebitis of the pelvic veins results.

Again, there may be a chronic pyæmia, which results from the slow peripheral spread from a septic focus. The chills begin three or four weeks after labour, there are intermissions of several days ; the endometritis is long cured, and the thrombosis is the only cause of the trouble.

Acute pyæmia usually ends fatally, and the chronic form may do so. Of 23 cases, beginning in the first week, only four recovered, a mortality of 83 per cent. It is clear that local treatment of such an infection by intra-uterine douches cannot aid, as the infective process has passed beyond the uterine walls.

Bumm saved two out of four cases of puerperal pyæmia, treated surgically, removing the thrombosed veins, and he gives the detailed histories of these cases.

The diagnosis may often be made under anæsthesia, after the first rigors, when the condition of the uterus can be ascertained by manual exploration, and the thrombus can be felt in the pelvic veins.

Interference must be undertaken early, before the spread of the streptococci from the original focus in the veins. Ligature and excision of the inflamed veins may be done either intra- or extra- peritoneally. The inflamed veins are readily seen and removed. Hysterectomy is usually unnecessary as the uterus is no longer affected.

Opitz[15] reports a case of puerperal pyæmia, following an abortion at three months, attended by a midwife. He removed a small placental polyp and several shreds of retained placental tissue, after which the condition became much worse.

Later on the patient's condition became so serious that the ovarian veins were ligated, and divided by the cautery.

Her condition improved immediately, but the patient died suddenly during the afternoon after drinking a glass of milk. Necropsy did not reveal the cause of death, the diagnosis of pulmonary embolism not being substantiated.

Opitz believes that cases of pyæmia, following abortion (especially criminal), with manual removal of remnants of placenta and placenta prævia, are especially unfavourable as regards prognosis. He collected 19 cases that were operated upon with 6 recoveries, and 18 cases that were not operated on with 13 recoveries. He further believes that some of the operative cases might have recovered regardless of operation; on the other hand, the shock and danger of the operation might have caused death in some of the cases. Nevertheless, the operation is not to be discarded, but employed in selected cases, especially the chronic ones.

Haeckel[16] reports a case of puerperal pyæmia treated by ligature of both internal iliac and ovarian veins with beneficial results. The patient had been curetted for a hydatidiform mole, and immediately acquired a raised temperature. This soon subsided, and the temperature remained normal until the twenty-fourth day, when there was a severe rigor which recurred daily until intravenous injections of collargol were given. The temperature still remained high, rigors returned, and the general condition became very serious. The operation was performed on the forty-fourth day, and the beneficial effect was noted almost immediately.

A case of acute puerperal pyæmia, treated in a similar manner, did not terminate favourably. It was complicated by an attack of pneumonia, and also by an anomaly in the right hypogastric vein, which consisted of a plexus of veins. It was, therefore, doubtful if ligation was complete, and no definite improvement occurred. The right common iliac vein was, therefore, ligatured twenty days after the first operation. The course of the disease did not appear to be modified in the slightest degree.

Giuseppe Guicciardi[17] considers that thrombo-phlebitic infection in the puerperal state is a rare form of puerperal sepsis. Initiated in the uterine cavity, the infection passes from the venous sinuses to the peri-uterine veins producing septic thrombi, and later becomes a generalised pyæmic process.

It should be kept entirely distinct from other forms of infection as to diagnosis, prognosis, and therapeutics. The prognosis is always grave, owing to the general infection which results and to the formation of local foci. The symptoms are frequency of pulse-rate, independent of the severity of the rise of temperature, a pyæmic temperature curve, intense chills repeated throughout the disease, general bad condition, and anæmia, peculiar character of the pain in the abdomen, and recognition of the thrombosed veins as resistant cords by bimanual examination. Bacteriological examination of the blood is ot little value, because it is both inconstant and contradictory in its results. A leucocyte count has only a relative value. Ordinary obstetric care is valueless.

There are precise and rational indications for surgical interference. Hysterectomy, abdominal or vaginal, is not to be recommended. Resection of the thrombosed veins is dangerous. Simple ligation is the best method of treatment. This results in the disappearance of local infective processes and pain. The best time for intervention is the twentieth day after labour.

Fromme,[18] of Halle, points out that while Bumm reports that the acute form of puerperal pyæmia is invariably fatal, and that, even in the chronic form, the disease presents a mortality oı 83 per cent. (as he was only able to save 4 out of 23 cases under his care), whilst von Winckel estimates the mortality at 95 per cent., yet, according to Seegert, Olshausen has been able to discharge cured no less than 61 per cent. of the cases of puerperal pyæmia which he has treated during the last ten years, his mortality being only 10 per cent.

He considers that conservative methods have all proved more or less ineffective. Sero-therapy can be of no use, when once thrombi have formed, and the effects of the injection of silver salts are at best extremely doubtful, so that Sippel, Trendelenburg, Freund, and, more recently, Bumm, have been justified in assigning puerperal fever to surgical treatment.

Bumm can report 5 cases dealt with by ligature of the ovarian and internal iliac veins with 3 recoveries. Other operators have not been so successful. Lenhartz had only one recovery in 8 cases. Opitz lost his only case. Haeckel saved one out of 2 cases on which he operated, and Friedmann saved the only case he operated on in this way.

Altogether, in the last two and a half years, 17 cases have been operated upon, and only 6 successfully—a result by no means brilliant. The chief reason for this may be that, usually, we do not know when the operation should be undertaken. We cannot diagnose how far the thrombo-phlebitic process has already extended, nor whether, although there may be no pronounced rigor, it may not already have reached the vena cava. On the other hand, the process may be still localised in and about the uterus, though it has been going on for a longer time. One should, therefore, when once the diagnosis of pyæmia has been established by the palpation of thickened tendinous cords in the uterine and ovarian plexuses, proceed to ligation forthwith. In bilateral thrombosis, one may, as Bumm has shown, ligature the ovarian and internal iliac veins on both sides without hesitation or fear of consequences.

Fromme records the case of a vi-para, aged 34, who developed pyæmia after an abortion. Nine days later rigors commenced, and in the right parametrium there was a diffuse infiltration, though thrombosed veins were not palpable. Six days later, pus was evacuated by vaginal incision and drainage. Fever and rigors continued, and staphylococci were recovered from the blood.

Four weeks after the first rigor, laparotomy was performed, and thrombi were found in the right ovarian vein, which, along with the right uterine artery, was ligatured. The left ovarian vein was also ligatured, although no thrombi were found in it.

For five days after operation there was no rigor. In the next three weeks there were four rigors, though, on some days, there was an absence of fever.

The patient died from pulmonary abscess and pleurisy on fifty-sixth day after the first rigor, and the sixty-third after the abortion.

Veit, in the discussion on this paper, said that he had made many trials of the intravenous injection of collargol, but that the results had been by no means convincing. The technique of ligaturing the veins was easier than it seemed. Just as both internal iliac arteries might be ligatured in abdominal extirpation of the uterus, so it was quite possible to ligature all four veins without fear of consequences. The danger of peritonitis was slight, because, in these cases, the germs did not proliferate easily in the peritoneum, but in the veins. He would not rely on the intravenous injection of collargol, and would ligature the veins in suitable cases.

Taylor[19] discusses the value of colpotomy in the thrombotic form of puerperal fever in a very lucid and instructive manner. In this form of puerperal fever, he says, the larger thrombosed vessels can be readily felt on careful vaginal examination; thrombosis of the uterine or ovarian vein being recognised by finding the hard tender cord of the rigid vessel extending from the uterus to the pelvic wall. The swelling, due to the thrombosis, is generally slightly increased by peri-vascular inflammation and swelling, and small abscesses may often be found in close proximity to the vessels.

The clot in the veins, though a carrier of infection, does not break down and infect the systemic circulation for some time, and, if only the base and surroundings of the clot can be got at and made clean, there is still, he thinks, a chance of aborting the disease, for it is here, in this limited tract of tissue, between the endometrium and the pelvic brim, in the uterine wall, and in the broad ligament around the large vessels, that the fight is going on for some weeks or a fortnight before the greater issues are decided, *i.e.*, before general pyæmia supervenes. If the surgeon wishes to help in the fight, here, where the battle is most active, is the place for his wisest interference.

He accordingly recommends opening up the vaginal roof on the side chiefly affected, and, in a good light, to search for small abscesses and pockets of pus in the uterine wall, and in the broad ligament; to empty these, stuffing the little cavities with iodoform gauze; and finally, unless it has already been done in the course of the operation, to open the pouch of Douglas, examine the parts from within the peritoneum, specially feeling for any abscess of the ovary, and, if there is further work to be done, leaving a thick piece of iodoform gauze behind the broad ligament and more or less surrounding the inflamed vessels.

He records three cases in which this procedure was carried out and which met with the most brilliant success.

Cuff,[20] of Sheffield, records the case of a woman, aged 30, who was attended in normal labour by a midwife, on November 6, 1905. Two days later, there was a rigor with profuse perspiration. On November 10, a doctor was called in, and he found the temperature 104·8°, the pulse 126, and the respirations 36. There was no uterine tenderness, and the lochia were not foul. A biniodide douche gave no results. Next day curettage was performed, a few small shreds of placenta being removed. The temperature continued to rise, with sweats. Injections of antistreptococcic serum were given four days in succession, without result. Soon afterwards, a doughy lump, about the size of the fist and not very movable, was apparent in the right iliac region. Vaginally, the lump was felt to be in the upper part of the broad ligament.

On November 25, rigors commenced and the patient's condition was getting rapidly worse. It was accordingly determined to explore, and deal with things as circumstances might direct.

Laparotomy was performed on December 3. In the right broad ligament was a moderately firm mass of the thickness of three fingers, stretching from the uterine wall internally to the pelvic wall externally. This was incised, and revealed only a thick bundle of thrombosed veins. The incision was extended and the peritoneum was reflected and a ligature of strong catgut was placed on the uterine side, a second ligature being placed farther out towards the pelvic floor. On trying the latter, a thick thrombosed vein was discovered, rising out of the pelvis. This was the ovarian vein, and it could easily be traced up to its junction with the inferior vena cava. A strong ligature was placed on it half an inch from the junction. There was much indurated œdematous tissue around the vein the whole way. Recovery was complete, but, for some time, night sweats persisted, and, for three or four days, the patient complained of pain in the left knee and hip joints.

The only other English contribution to this subject was inspired by the foregoing. Landon[21] records a case, in which a rigor occurred on the third day after labour, and was followed by irregular fever for ten days, in spite of frequent intrauterine douching. At the end of the second week, a mass was felt to the right of the cervix, which, on examination through an incision in the posterior formix, proved to be due to thrombosis of the veins of the right broad ligament. The abdomen was opened, and the ovarian vessels of that side were included in a catgut ligature. There was some improvement for a few days, but a further wave of pyrexia set in three days after operation. Antistreptococcic serum was administered, and the fever again subsided, but another rise occurred ten days later, accompanied by a scarlatiniform rash. This gradually subsided and the patient recovered.

This subject has been well summed up by Sir William Sinclair [22] in the following words :—" A perusal of many papers on the subject of puerperal pyæmia assuming the form of metrophlebitis with complications, and the details of the recorded cases, will probably bring the reader to the conclusion that, though there is some place for these grave operations, they will be but seldom required. Occasionally, in a severe case, the patient may still be in a condition to justify recourse to abdominal section and complicated manipulations in the pelvis, but it seems most probable that the views of Lenhartz and Seegert will prevail, and that, when operations must be done, they will be of the most conservative order, like the colpotomy advocated and practised by Taylor."

III.—ABDOMINAL OR VAGINAL SECTION FOR PUERPERAL PERITONITIS.

Leopold,[23] of Dresden, considers that the surgical treatment of puerperal peritonitis promises a greater proportion of cures than can be obtained by any other method. He gives a detailed account of the following cases :—

1. Five cases of acute generalised peritonitis, in which abdominal section was performed. Three recovered, and two, in whom the operation was far too long delayed, died.

2. One case of pyæmia, phlebitis purulenta puerperalis, in which again the operation was performed far too late, and ended fatally.

3. Five cases of circumscribed peritonitis, all of which

recovered, being operated upon at various periods from 19 to 49 days after delivery.

In acute puerperal peritonitis the proper moment for operative interference must not be allowed to pass. In the beginning of the disease laparotomy may do good; it can hardly do any harm. In some cases of the venous form of puerperal fever, also, the operation can hardly be done soon enough. Thus, Leopold has found the ovarian and renal veins, and even the vena cava, full of pus as early as the sixteenth day of the disease. In circumscribed peritonitis the discovery of the causal focus of pus must be made, for on this its liberation depends.

Seven cases treated by laparotomy and drainage in Bumm's clinic are reported by Kowatzki.[24] Five recovered, in two of which the infection was streptococcic, and in the other three mixed and saprophytic. The diagnosis was made by puncture. Meteorism, vomiting, belching, and moderate abdominal pain usually appeared slowly and late.

Incisions were made in the deepest lumbar and inguinal regions. Rubber drainage was then established through each side, and from side to side. Drainage was very free, and from time to time the drainage tubes were flushed with saline solution to keep them pervious. Relief was very rapid, and recovery occurred in 20 or more days. It is necessary to make sure of the diagnosis by puncture, and not to wait too long.

Knyvett Gordon[25] records ten consecutive cases of puerperal peritonitis, which were admitted into the Monsall Fever Hospital, all of which were treated by abdominal section. Four died and six recovered. All the patients were in a critical condition, many being in a hopeless state, when the operation was performed. Gordon considers that it is best not to flush or even sponge the peritoneal cavity at all, but merely to rely upon free drainage at the most dependent part, with subsequent propping up of the patient in the sitting position, and the subcutaneous injection of saline solution, with or without antistreptococcic serum and adrenalin.

Gordon goes on to say: "In almost every case of puerperal fever, admitted to this hospital, which has been attended by the certifying practitioner from the onset, there is a history of much valuable time wasted in the administration of small doses of quinine internally, and daily vaginal douches. The most that is ever attempted in the way of operative treatment is an intra-uterine douche, and I am not sure that this does not do more harm than good. One cannot cleanse the uterus in puerperal septicæmia by merely playing on its interior with anything; it needs scrubbing."

Sourdille[36] considers that the results of hysterectomy in grave puerperal infections are disastrous. He records seven cases treated by opening the peritoneal cavity and drainage, in six of them, by posterior colpotomy, with four recoveries, and in one, by laparotomy, which also recovered. He considers that laparotomy without hysterectomy is indicated (1) in cases of general puerperal peritonitis; (2) in cases of pelvic lesions, such as abscess of the uterus or ovary, salpingitis, and phlebitis of pelvic veins; and (3) in puerperal infections without extra-uterine lesions.

Jeannin[37] has made a most exhaustive study of this subject, and has prepared an excellent paper, in which he states that the treatment of general puerperal peritonitis has made great strides in advance since the adoption of surgical methods, and that the results are improving daily.

He has collected from medical literature 118 cases that have been operated upon. These he classifies, and adds to them three cases of his own. He finds that there have been 60 recoveries and 61 deaths after operation, *i.e.*, nearly half the cases have recovered. There are varieties of puerperal peritonitis, the prognosis of which varies in case of operation. In the hyperacute cases death always ensues, whilst the more chronic cases are often cured by operation. The operative prognosis improves as the length of time between delivery and the onset of peritonitis increases.

Post-partum peritonitis is always worse than post-abortum peritonitis, the latter form proving the most favourable for operation. The immediate cause of the peritonitis may be a propagation of the uterine inflammation to the peritoneum, any trauma of the uterus, or involvement of the appendages. This is the common form, where the prognosis is good. It rarely results from a perforation of the uterus, where the prognosis is bad. When there are consecutive lesions of the appendages, operation is usually successful. Acute diffuse peritonitis is the usual form. This begins from the third to the sixth day, and the proportion of recoveries is 44 per cent. In phlegmonous peritonitis, where there is a tendency to the formation of false membranes with walling off the intestines from the pus deposits, the results of operation are most favourable. The most benign form is that in which there are several foci walled off from the general peritoneal cavity.

As to the microbic source of the infection, the largest number of cases is caused by streptococci, and these cases are as amenable to surgical treatment as are those which are caused by other micro-organisms. In cases of peritonitis left to themselves, there is invariably a fatal issue. In those treated surgically, there are frequent successes; hence one is driven to the conclusion that every case of puerperal peritonitis should be operated on as soon as the diagnosis is made.

Sinclair[28] is much impressed with the value of abdominal section in the treatment of puerperal peritonitis. He records a successful case, and considers that the technique of the operation is simple enough to bring it within the reach of the general practitioner, even in rural districts, and that it is essentially a small exploratory incision added on to what every medical attendant on a case of puerperal fever should be prepared to do, and that the tendency at present is to do the least possible consistently with certain principles, and this promises to be the most successful treatment.

He further believes that a time is coming when, with early diagnosis and prompt action, posterior colpotomy and flushing through a tube will be sufficient in nearly all cases of puerperal peritonitis.

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THE SYMPTOMS AND CONDITION OF THE BLOOD IN PERNICIOUS ANÆMIA.

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THERE is, I think, no doubt that pernicious anæmia is more frequently diagnosed now than it was formerly, for I do not remember seeing more than two or three cases while I was a medical student, and yet, during the last two and a half years, I have seen ten undoubted cases. Whether it is that pernicious anæmia is increasing in frequency or not, I cannot say, but I am inclined to think that as more blood-examinations are undertaken nowadays, it merely is that more cases are recognised, for a correct diagnosis is impossible without a thorough examination of the blood. It is of great importance that an early diagnosis should be made in pernicious anæmia, for if treatment is begun early there is every prospect that the fatal end may be delayed for several years, and not for eighteen months or two years as is generally supposed. For instance, I know of a case which was known to be suffering from pernicious anæmia for over nine years before death occurred.

Ten cases is, of course, not a sufficiently large number from which to draw any definite conclusions, but I think an analysis of their symptoms, and of the condition of their blood, may be of help in identifying other cases.

All my ten cases complained of loss of strength, palpitation, and dyspnœa on the slightest exertion, and five of them also sought relief for pain in the abdomen. This last symptom is interesting because of Hunter's view that pernicious anæmia is an infective disease, the seat of the infection being somewhere in the digestive tract.

In appearance, the patients generally were well nourished, certainly not emaciated, in only one, was there slight jaundice, and in one other, there was a marked lemon-yellow colour of the skin, while, in the remaining cases, the patients, though waxy-looking, had not the yellow tint usually associated in one's mind with pernicious anæmia. In the case with the slight jaundice, the epigastric pain and loss of strength in conjunction with morning sickness raised the question as to whether the patient might not have cirrhosis of the liver; an examination of the blood, however, at once settled that the patient was suffering from pernicious anæmia. The skin itself is usually dry. In two cases there were petechiæ; as a rule, when hæmorrhages occur under the skin in this disease they are small.

Œdema was present in every case, the most frequent places being the lower parts of the legs, and the lower eyelids, giving to the face a puffy look, rather like that seen in tubal nephritis. This puffiness of the face was more or less marked in all my cases, and œdema of the ankles was present in all but one. Although slight in amount, the œdema is most persistent, and, as a rule, is independent of the position of the body. In three cases there was tenderness on pressing the tibiæ.

Hæmorrhages occurred in half the number of cases, in two it was in the form of petechiæ, as already mentioned, in one there was bleeding from the bowel, in another hæmatemesis, and in the fifth case there was oozing of blood from the mucous membrane of the mouth, that is to say, that in more than half the cases, in which hæmorrhages occurred, bleeding took place in some part of the digestive tract.

The cardiac sounds are practically always affected, in all my cases there was a hæmic pulmonary bruit, in six of them, there was in addition a murmur audible at the apex, systolic in time. In one of my cases, there was a soft blowing systolic bruit audible all over the heart.

The digestive system was involved in one way or another in every case. All the patients complained of loss of appetite, in five pain was the symptom most complained of, usually epigastric, but, in one case, it was more widely diffused over the abdomen. It was not very severe in type, except in one case, in which it came on rather suddenly, lasted for several hours, and appeared to cause intense agony. In none of the cases did it appear to have any connection with food.

In seven of the cases vomiting occurred. In two of the cases it was most intractable, and lasted for a day or two at a time, nothing being retained, in one it was associated with pain, in another it was not. In another patient, the vomiting was accompanied with great pain in the epigastrium, simulating a gastric crisis of tabes dorsalis, and in another case, it occurred every morning, which, in association with slight jaundice, and tenderness in the epigastrium, suggested cirrhosis of the liver.

Diarrhœa occurred in every case except one, and was sufficiently troublesome at times to be mentioned by the patient without its being enquired for. In one of the patients, it had been his first symptom, now nearly three years ago, and at the present time, if he relapses at all, it occurs again at once. In another case, the diarrhœa had been most troublesome during the winters of 1905 and 1906, but last winter (1907), as he had been treated for pernicious anæmia during the preceding six months, he was free from it.

In one case only was there slight splenic enlargement, in none was either the liver, or any superficial gland found enlarged.

In certain cases, nervous symptoms have been the most prominent, though none of my cases suffered from them. Dr. Gulland[1] has published an address on "Anomalous Cases of Pernicious Anæmia," in which one patient suffered from amaurosis, in another, the symptoms resembled peripheral neuritis, and a third in whom an attack of aphasia was accompanied by a violent epileptiform convulsion.

It is clear that the symptoms of pernicious anæmia may be many and varied, in one case, a gastro-intestinal disorder may be stimulated, in another, the patient may apparently have a nervous disorder, or again there may be complaints of nothing except weakness, loss of breath, and œdema, which might be due merely to chlorosis.

By the examination of the blood alone can the diagnosis be at once settled, and, for the sake of cases of pernicious anæmia, I should urge that more frequent routine blood examinations should be undertaken, many of course would show nothing abnormal, but, at any rate, I feel sure that, as a result, many more patients with pernicious anæmia would have their disease recognised earlier, and appropriate treatment started, and possibly harmful treatment avoided, for if the case were thought to be chlorosis, and iron administered, it would be one of the worst possible things for pernicious anæmia.

The blood in a typical case is absolutely characteristic, and is not to be mistaken for any other disease.

The percentage of hæmoglobin is diminished, it may be only slightly, or a great deal, the average in 25 estimations in my ten cases is 42·4 per cent., the highest being 63, and the lowest 20 per cent. As a rule, the reduction is not so great as in equally severe secondary anæmias. Of greater importance than the percentage of hæmoglobin is the relation of that percentage to the percentage of red corpuscles. In a case in which the colour index is 1, or greater than 1, the suspicion of pernicious anæmia should be such that a fuller examination of the blood ought to be made. Generally the fewer the red corpuscles, the higher is the colour index. In one of my cases, the red cells were reduced to 600,000 per cmm., and the colour index was 1·6; in another case, with 1,630,000 red corpuscles per cmm. the colour index was 1·5, as the patient improved, the red cells rose to 3,150,000 per cmm., and the index dropped to 1. A high colour index is not in itself pathognomonic of pernicious anæmia, but a high one should put one on guard, nor does a low one contraindicate this disease. The high index is explained by the large number of megalocytes present.

The red corpuscles are reduced in number. In my series the lowest count was 600,000, and the highest just over 3,000,000 per cmm. at their first examination. The number present is not of much help in estimating the severity of the disease, of greater importance are the alterations in size, shape, and staining reactions.

The size of the average red corpuscles varies between 7 and 8 μ, and one of 9 μ is distinctly large. In pernicious anæmia, megalocytes of the size of 11 to 13 μ are common, while frequently, in doing a differential count, single specimens of 15 or 16 μ are seen. The easiest way to be certain of the presence of megalocytes is to have in the eye-piece a micrometer-scale, the value in μ of each division of which is known for every objective used; by this means the size of any corpuscle in the field is measured by merely moving the stage, until the corpuscle is under the scale. Ewing[2] says that unless 33 per cent. of the cells are distinctly over-sized, the diagnosis of pernicious anæmia should be made with great reserve. Microcytes, on the other hand, are much less common except in the later stages of the disease and the same also applies to marked poikilocytosis.

Polychromatophil and granular degeneration of the red cells occur, the former very constantly. In polychromatophil degeneration, the stained cell may vary in colour from lilac to quite deep blue (when Jenner's stain has been used), and when once recognised, is very easily recognised again, and is most characteristic of the disease. In granular degeneration deeply stained granules, very dark blue in colour, are scattered throughout the cell, while frequently the protoplasm shows polychromatophil degeneration also.

Normoblasts generally occur, though not in great numbers, in one case only of mine did I fail to detect them at some time or another; they may be found on one film, and perhaps not on another made at the same time. Of greater importance than the normoblast is the presence of megaloblasts, in fact the discovery of a large megaloblast with an abnormal nucleus in an adult is almost pathognomonic of pernicious anæmia. Very important is a cell known as Engel's metrocyte; this is a megaloblast in which the nucleus occupies four-fifths of the cell and is reticular, while the surrounding protoplasm shows polychromatophil degeneration. Megaloblasts were present in all my cases though not in great numbers, the highest being 28 seen while 500 leucocytes were being counted. The most convenient way to express their frequency is by saying that so many were noticed while a definite number of white cells were being counted. Sometimes prolonged search is necessary before a megaloblast is seen, in fact two or three films may have to be systematically gone over before one is found, so that the finding of a megaloblast is of greater diagnostic value than is the non-discovery of one. In any doubtful case, where other signs point to pernicious anæmia, the finding of one definite megaloblast is sufficient to settle the diagnosis.

The white cells are reduced in number, in my series the average was 3,200 per cmm., the lowest being 1,580, and the highest 5,800, this last count was during a remission, at other times in the same case the count was as low as 3,000. If the reduction in the white corpuscles is not less than 4,000, it is unlikely to be a case of pernicious anæmia. The most characteristic feature about the white corpuscles is this leukopenia associated with a relative lymphocytosis, in my cases the average percentage of lymphocytes was 50·9, mostly of the small variety. Almost in proportion as the number of lymphocytes rises, the percentage of the polymorphonuclears falls, for the proportions of the other white cells do not show great variation from the normal.

The percentage of eosinophils is nearly always less than 4, in my series the highest was 3·5, the lowest ·1, the average being 1·7. If the percentage is higher than 4, it is distinctly against the case being one of primary pernicious anæmia. If the patient's symptoms suggest pernicious anæmia, and the blood points to it in every respect, except for an eosinophilia of over 4 per cent., then the fæces should be searched for the ova of intestinal parasites, particularly of ankylostomum duodenale, for this parasite causes a grave secondary anæmia, in which the blood changes may be indistinguishable from those of primary pernicious anæmia except for an eosinophilia. Boycott and Haldane[3] showed that, in 94 per cent. of 148 cases of ankylostomiasis, there was an eosinophilia of over 8 per cent., while the average for the 148 cases was 18 per cent.

In some cases there may be a few myelocytes present, usually well under 1 per cent.

The recognition of idiopathic pernicious anæmia, in any case with obscure symptoms, rests on the following blood changes, reduction in the number of red corpuscles, with a high colour index, and leukopenia. The presence of megalocytes in large numbers, and of normo- and megaloblasts. Among the white corpuscles a lymphocytosis, usually of over 40 per cent., and a not greater percentage than 4 of eosinophils.

Lastly, let me again urge that blood examinations should be undertaken as part of routine work almost as frequently as examination of the urine, for though many would show nothing abnormal, I feel sure that many more cases of pernicious anæmia would be recognised earlier, and that much good would arise from it.

REFERENCES.

[1] Gulland: *Brit. Med. Journ.*, 1907, Vol. I., p. 68.

[2] Ewing: *Clinical Pathology of the Blood*, p. 218.

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THE CONDITION OF THE GUMS IN MEASLES.

BY FRANK E. TYLECOTE, M.D., D.P.H., M.R.C.P.,

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I.—INTRODUCTORY.

DURING the last few years, it has gradually become more and more customary for practitioners to carefully examine the buccal mucosa for the presence of the so-called Koplik's spots, in cases in which measles is suspected, but in which, because the rash has not yet appeared, is not fully out, or is atypical, the diagnosis is, in the absence of this sign, in doubt.

In this note I wish to draw attention to another sign, which I believe to be of diagnostic value in measles, and moreover, to be free from some difficulties which are associated with the recognition of Koplik's spots, and to which I shall allude later.

II.—INTENSE GINGIVAL HYPERÆMIA AS AN EARLY SIGN.

When an outbreak of measles has occurred in the wards of a hospital, or in a house, one naturally investigates with extreme care any slight rise of temperature occurring in patients in the same ward or house ten days or so later, which might turn out to be the slight rise of the invasion stage of measles.

In the course of the last four or five years, observations of this nature, made on a large number of children, have convinced me that I can tell in what cases I am going to find Koplik's spots by the appearance of the gums, which I catch sight of, in the act of turning back the cheek wall to look for Koplik's spots in the most typical situation, *viz.*: on the inside of the cheek, over the first lower molar tooth.

In this movement, as in that of depressing the lower, or raising the upper lip, one gets a good view of the gums, which, in every case of measles, are in a condition of intense hyperæmia, redness, or injection, with slight swelling.

As a rule, the uniformly injected gum is coated here and there with a patchy whitish scum, which is easily removed, and which consists of epithelial squames and débris.

The injection of the gums has its origin as early as Koplik's spots, *i.e.*, two to three days before the rash appears, while it persists longer than they do, even, in some cases, till the rash begins to fade.

If the gums at the onset of measles are compared with the gums of patients in the initial stages of scarlet fever, of rubella, or of influenza, the contrast is very marked. The gums in these three affections present the normal pink appearance, unless there is a complicating stomatitis, which is not common in the initial stage of any of these affections, and which, if it does occur, is patchy and not uniform.

III.—THE RELATIVE VALUE OF GINGIVAL HYPERÆMIA AS COMPARED WITH KOPLIK'S SPOTS AS AN EARLY DIAGNOSTIC SIGN.

The claim that gingival hyperæmia deserves recognition as a point of some value in the early diagnosis of measles, even in preference to Koplik's spots, may be briefly outlined under the following heads:—

(a) *Ease of Observance by either Natural or Artificial Light.*—It is a sign easily observed by either natural or artificial light, whereas I have frequently known cases, in which Koplik's spots were definitely present, but were not identified, owing to their being only searched for by artificial light, by which they are seen with extreme difficulty.

(b) *Simplification of Method of Examination.*—Apart from the light difficulty, in the examination of babies and small children, it is often almost impossible to get the child sufficiently quiet to obtain a good view of the inside of the cheek, or deep part of the lip, so as to search for Koplik's spots; but it is always possible to move the lips so as to obtain a view of the gums.

(c) *Incidence.*—This condition of the gums is practically constant, as are Koplik's spots, but it varies in intensity.

(d) *Time of Appearance and Duration.*—Gingival injection appears as early as Koplik's spots—from two to three days before the rash—and persists longer than they do, *i.e.*, it may even persist till the rash is beginning to fade.

(e) *Differential Diagnosis.*—This sign does not present the difficulty in diagnosis which Koplik's spots present to some, who, not having had the real spots demonstrated to them clinically, confuse them with an aphthous stomatitis. Again, the persistence of this sign after Koplik's spots have disappeared may suffice to clinch the diagnosis in a case first seen with a well-developed, but atypical rash.

IV.—GINGIVITIS AS A COMPLICATION OF MEASLES.

I observed in one epidemic of measles, in which all the cases, over 50 in number, came from one school, a well-marked marginal ulcerative gingivitis as a complication in 60 per cent. of the cases in the third week.

V.—TREATMENT.

The gingival hyperæmia requires no treatment, but, in the case of those patients who are old enough to use it, a mild alkaline mouth-wash is an advantage. In the epidemic, where marginal gingivitis occurred as a complication, I obtained the best results and most rapid healing with a mouth-wash containing tincture of myrrh ½ an ounce, and borax 2 drachms to 12 ounces of water, used frequently; in young children the same solution was regularly dabbed on the gums.

William H. Broadbent.

CAT.
E.H.B.

LEADERS IN MODERN M[illegible]

VII.—SIR WILLIAM H. BROAD[illegible]

[With Plate I.]

SIR WILLIAM BROADBENT was a [illegible] wider sense of the term. As Sir [illegible] him: "There was no branch of medicine [illegible] at home, and there were few in which he ha[illegible] pendent observations." He was univ[illegible] authority on affections of the Heart [illegible] the pioneer in the elucidation of the d[illegible] nosis in both valvular and structural dis[illegible]

Of his work in Neurology, Professor [illegible] at St. Mary's Hospital Medical School, in [illegible], said: His studies on diseases of the Nervous Syst[illegible] a[illegible] the best of those memorable contributions m[illegible] by that remarkable group of men who [illegible] that is best in British Neurology." [illegible] is known throughout the civilised wor[illegible] the theory of construction of the Nerv[illegible] he gave a clear exposition of his views on [illegible] speech and thought, is one of the most imp[illegible] to the elucidation of the problems present[illegible]

Of the acute specific Fevers, he acquired [illegible] knowledge, through being attached to the London [illegible] Hospital, at a time when that was the only institution in London for the reception of fever cases of all kinds. Enteric Fever especially interested him. He strongly deprecated the so-called "expectant," or do-nothing, policy in the treatment of this affection, and, in his Cavendish lecture on "Some Points in the Treatment of Typhoid Fever," delivered in 18[illegible], he indicated how much could be done for the pati[illegible] dieting and suitable therapeutic measures.

William Henry Broadbent was born at [illegible] country village in Yorkshire, on Jan[illegible] father was a woollen manufacturer, and [illegible]

William T. Broadhead.

LEADERS IN MODERN MEDICINE.

VII.—SIR WILLIAM H. BROADBENT, BART.

[With Plate I.]

SIR WILLIAM BROADBENT was a great physician in the wider sense of the term. As Sir Thomas Barlow has said of him: "There was no branch of medicine in which he was not at home, and there were few in which he had not made independent observations." He was universally recognised as an authority on affections of the Heart and Circulation, and was the pioneer in the elucidation of the difficult problems of prognosis in both valvular and structural disease of the Heart.

Of his work in Neurology, Professor Osler in his address at St. Mary's Hospital Medical School, in October 1907, said: "His studies on diseases of the Nervous System are among the best of those memorable contributions made in the seventies by that remarkable group of men who stood for everything that is best in British Neurology." Broadbent's Hypothesis is known throughout the civilised world, and his paper on the theory of construction of the Nervous System, in which he gave a clear exposition of his views on the mechanism of speech and thought, is one of the most important contributions to the elucidation of the problems presented by Aphasia.

Of the acute specific Fevers, he acquired an intimate knowledge, through being attached to the London Fever Hospital, at a time when that was the only institution in London for the reception of fever cases of all kinds. Enteric Fever especially interested him. He strongly deprecated the so-called "expectant," or do-nothing, policy in the treatment of this affection, and, in his Cavendish lecture on "Some Points in the Treatment of Typhoid Fever," delivered in 1894, he indicated how much could be done for the patient by careful dieting and suitable therapeutic measures.

William Henry Broadbent was born at Lindley, a small country village in Yorkshire, on January 23rd, 1835. His father was a woollen manufacturer, and wished that his son should succeed him in the business. Young Broadbent accordingly left school at the early age of 15, and, for two years, was engaged in learning the various processes of manufacture. It was, however, soon evident that this occupation was not congenial to his tastes, as he had always had a leaning towards science, and wished to take up medicine as a career. He was, therefore, permitted to follow his bent, and, at the age of 17, was apprenticed to a surgeon in Manchester, as, at that time, the system of apprenticeship was still in vogue. The indentures were signed for five years, and the premium paid was supposed to cover the expenses of his medical course at Manchester.

He was, however, often hard put to it to obtain the necessary money required for the fees for the various practical courses at Owens College. The expedients to which he had recourse in order to economise for this purpose were original and entertaining. To one of his brothers he wrote, "I hope you will find me a few more snails and big worms. One of those sent I dissected, but the other I suppose did not like the solitary confinement, so during the night he decamped. Fortunately the kitchen here is infested with cockroaches, and I have quite mastered their anatomy. In a letter to one of his sisters he said, "I want you to go into the fields and get me as many flowers as you possibly can, no matter how insignificant they may look, the commonest weeds will do, in fact anything in the form of a flower."

While studying for his examinations, long before he had any real knowledge of his profession, he had to visit patients, examine them, prescribe for them, and make up their medicines. His master was very careless about his practice, and often left to him the entire responsibility of it for days together. He used to relate, in after years, how he would go on his round to visit his patients, and note down in his mind the symptoms of which they complain, and the physical signs which he could detect. Returning home he would search through his books till he could find the ailment which they seemed to fit, and would then prescribe and make up some medicine for them. So much for the "good" old days of apprenticeship.

The surgery was at some distance from the house in which he lived, and, after leaving home in the morning, he did not usually return till evening. He had no separate study or sitting-room, and shared his bedroom with a fellow student, and it is marvellous how he found time or opportunity for reading.

The following quotation from a letter written by him during this period will give some idea of the difficulties with which he had to contend :—"I have had so much to do in practice lately that I have had scarcely any time for study. Nearly every morning I have to walk four miles, and see a patient before going to the hospital, and often when I should be working in the evening, I have a long dismal round of five or six miles. To-day it has been snowing hard, and the streets are consequently covered to a depth of several inches. I set out to see two patients after the six o'clock lecture, when of course it was quite dark, and the snow was falling fast. I walked along as fast as I could, and as I came to a low part of the city I had a foretaste of the treatment I was to expect in the shape of a snowball. . . . I had seen one patient, and been hit several times, when unfortunately I fell in with a regular mob of mill hands. The cry was 'Here's a hat!' and they began to pelt me with all their might. My hat went and I was hit on every part at once. Picking up my hat, and, holding it on with one hand and my spectacles with the other, I made my way from them. I got along till I came to another very bad part. I was going down a street, and was told I had better turn back. I went on, and soon came up to a group, but as they were engaged in pelting a poor woman I approached them unperceived. I saw what I had to expect, and when one of them had just hit the poor woman on the head, I walked up to him gave him a kick behind, and a good cuff which sent him rolling in the snow. The rest, I believe, thought I was a policeman, for I walked quietly on, not heeding their shouts or threats, and not a snowball was thrown at me. I saw my other patient, and reached home tired and wet, but had to set off again to the surgery."

His indomitable pluck and perservance carried him triumphantly through these trials, and he not only passed every examination with flying colours, but at Owens College gained medals in almost every possible subject, in Botany, Materia Medica, Anatomy, Physiology, Chemistry, Midwifery, Surgery, and Operative Surgery. In July 1856, the fourth year of his apprenticeship, he went up to London for the first M.B. examination at the London University and carried off the gold medals

Hospital by the retirement of Dr. Chambers from the staff, and he was appointed Assistant Physician, but not without some opposition and considerable trouble and anxiety, for, in those days, all the lay governors had to be approached by a general canvass. In 1866, he published his memorable "Hypothesis" on the "Bilateral Association of Nerve Nuclei to the higher Centres," by which he explains the escape from paralysis in hemiplegia of muscles which always act together.

In 1869, he was elected a Fellow of the College of Physicians, and, in 1871, he became physician in charge of in-patients at St. Mary's Hospital. He was now beginning to reap the reward of his years of work. In 1872, he moved to a larger house at 34, Seymour Street, and each year his income continued to increase. His output of original and literary work, during the years 1869 to 1873, was enormous, some of his most important papers being "An Attempt to apply Chemical Principles in Explanation of the Action of Remedies," "On the Structure of the Cerebral Hemispheres," "On the Mechanism of Speech and Thought" and the Lettsomian lectures "On Syphilitic Diseases of the Nervous System." Throughout his career, at a time when his extensive consulting practice allowed him no leisure moments during the day, he continued to make important contributions to medical literature. In 1884, he delivered the Harveian lectures on Prognosis in Valvular Disease; in 1887, the Croonian Lectures on the Pulse, and, in 1891, the Lumleian Lectures on Structural Diseases of the Heart from the point of view of Prognosis, which were the basis of his books on "The Pulse" and "Heart Disease." Space will not permit of further enumeration of his writings, which have been collected by his son, Dr. Walter Broadbent, and recently published in book form.

In 1891, he was sent for to attend the Duke of York, the present Prince of Wales, in his attack of typhoid fever. In 1892, he was called to Sandringham to the Duke of Clarence, when he was struck down by pneumonia, and remained in constant attendance throughout this fatal illness. In the same year, he was appointed Physician in Ordinary to the Prince of Wales, now our King, and, in 1896, Physician Extraordinary to Queen Victoria. On the death of the Queen he was appointed Physician in Ordinary to His Majesty, King Edward VII., and to H.R.H. the Prince of Wales. He was created a Baronet in 1893, and a Knight-Commander of the Victorian Order in 1901.

In 1904, he was one of the chief organisers of, and was the first President of the Entente Cordiale Médicale, and at the banquet given at Paris in honour of the English Physicians, he was invested with the Grand Cross and Insignia of a Commander of the Legion of Honour. It was on this occasion that he made the happy allusion to King Edward as the "paratonerre" or lightning conductor of Europe, in view of the diplomacy that he had displayed in dispelling the threatened misunderstanding between France and this country, and establishing cordial relations between them. Sir Wm. Broadbent was a Fellow of the Royal Society, and received the honorary degree of LL.D. from the Universities of Edinburgh, St. Andrews, Montreal, and Toronto, and that of D.Sc. from the University of Leeds. He was President of the Medical, Clinical, Neurological, and Harveian Societies, and vice-President of the Imperial Cancer Research Fund.

He was the leading spirit in the organisation of the campaign against Tuberculosis, which has been the means of making the public realise the infective nature of the disease, and he was Chairman of the National Association for the Prevention of Consumption. He was always ready to lend a helping hand to his poorer brethren, and for many years was Treasurer, and subsequently President, of the British Medical Benevolent Fund, to which he was a generous subscriber. To his patients, poor and rich alike, he was always considerate, courteous, and sympathetic, and in his professional relations, his standard of probity was of the highest.

In conclusion, to quote once more from Sir Thomas Barlow's words in the *Brit. Med. Journal* of July 20, 1907, "He was one whose life was full of work and strenuous endeavour, who received, in his time, some of the highest rewards of his profession, and was one of the most successful physicians of the Victorian Era, and who throughout his long career maintained the lofty standard of English Medicine, and left a memory of humble Christian faith, of high and noble aims, and of devotion to the service of man."

NOTES FROM FOREIGN JOURNALS.

TREATMENT OF HYPERIDROSIS BY FORMOL.

According to Viela, formol is now one of the drugs officially provided in military hospitals, as it has been found to be particularly efficacious in the treatment of plantar hyperidrosis.

The method of treatment is simple; first, the excessive sweating is suppressed by applications of the solution in increasing strength, and then the result is kept up by periodical applications. The following procedure is recommended:—

First day.—The plantar surface is painted over, by means of forceps and a dosset of wool, with a 1-in-3 solution of commercial formol three times—morning, noon, and evening.

Second day.—Three similar applications of a 1-in-2 solution.

Third day.—Three applications of the undiluted solution.

In order to keep up the result, one application of the undiluted solution is made each week.

If the epidermis is much macerated, it will be necessary to begin with solutions of 1 in 10, 1 in 20, or even 1 in 30, according to the amount of sensitiveness present. If the application gives rise to too much smarting, the foot should be washed with ordinary water, and another application made with a weaker solution. Formol not only suppresses the sweat, but also hardens the epidermis. A few drops sprinkled into the boots deodorises and disinfects them.

Advantage may be taken of this property of formol to treat those subject to palmar hyperidrosis, but it has a slightly deadening effect upon the sense of touch, giving the impression, on contact of the fingers with an object, that a thin piece of goldbeater's skin has been interposed.—(*Archives de Médecine militaire.*)

A SURGICAL SOAP.

Richaud recommends the following formula for producing a soap eminently suitable for use in surgery, which is liquid, froths well, and easily penetrates into the interstices of the skin:—

White soap Soft soap	of each 2¼ lbs.
White oil	17½ fluid ounces.
Water	5½ pints.

Rasp the white soap, and warm these ingredients together so as to form a paste. Then add to this:—

Glycerine	2 fluid ounces.
Naphthol β.	1½ ounces.
Alcohol (90°)	17½ ounces.
Essence of lemon	1½ ounces.

Water to 3½ gallons.

(*Journal de Médecine et de Chirurgie pratiques.*)

VISCUM ALBUM IN THE TREATMENT OF TUBERCULAR HÆMOPTYSIS.

Levrat reports, in the *Lyon Médical*, several cases of hæmoptysis in phthisis, which have been effectively treated by extract of mistletoe. He used the aqueous extract, recommended by René Gaultier, in pills of 4 c.g. (three-fifths of a grain), of which eight were administered in the course of 24 hours. At the end of two days all blood-spitting had ceased. The aqueous extract has an agreeable smell, something like that of a pippin, and, being easily soluble in water, can be given in a draught, or in syrup, as well as in pills. Levrat has also given it by hypodermic injection, but not sufficiently to justify a decided opinion. The average dose is 0·20—0·30 g. (3 to 4½ grains) a day, taken in fractional doses. Larger doses have an irritant action upon the intestinal mucous membrane.

The physiological effects observed have always been a marked and continued fall in the blood-pressure, with, at the same time, increase in the frequency of the pulse rate. Gaultier has obtained good results from the use of this drug, not only in the treatment of hæmoptysis, but also in arterio-sclerosis, its use in the latter being particularly indicated for patients who cannot tolerate iodides.

SPASM OF THE ANUS CAUSING CRYING IN AN INFANT.

Planchu reports, in the *Lyon Médical*, the case of an infant, in whom continual, loud, and violent crying was caused by spasm of the anus, without any apparent anatomical lesion. The child was quite healthy, but began to cry when about one week old. Careful examination revealed a perfectly normal condition throughout, and the absence of any fissure in the anus was particularly noted. The motions were normal, and the child throve steadily. Nevertheless, it cried almost continuously day and night, only sleeping in all about two hours a day. Planchu tried everything in vain, including a change of nurse. The convulsed face and spasmodic movements of the limbs pointed to pain, the origin of which had to be found. Weill was called into consultation, and sought to discover the existence of spasm, as to the frequency of which in infants he has called attention. At the end of his examination he sought to examine *per rectum*, and was struck by the firmness of the contracted sphincter. He thereupon proceeded to dilate several times, using his little finger for the purpose. Following upon this, the child slept soundly for three hours, then took a meal, and slept again. Crying began again during the night, but was immediately quieted by anal dilatation. This procedure was required once more on the following day, after which the child became quite quiet, slept well, and enjoyed perfect health. Planchu has since, in like manner, dealt successfully with similar cases, and Leclerc recalls, in this connection, the common practice among mothers and nurses of introducing a suppository, or even a piece of soap, through the anus when a child cries. Even if an action of the bowels is not caused, the children are very often quieted.—(*Journal de Médecine et de Chirurgie pratiques.*)

THE ACTIVE AGENT IN TREATMENT BY ARSENIC.

A paper was read, at the *Société de Thérapeutique* by Martinet, on this subject, in which he maintained that the organic compounds of arsenic, of which much is heard nowadays, only act by the arsenic which they contain, and can, on occasion, become very poisonous. The existence of their therapeutic action is dependent upon the liberation of the arsenic, and, as they contain notable quantities, and are used in doses (calculated in their value in arsenic) very much larger than those of the inorganic salts, everything depends upon the assimilation of the arsenic, of which, under normal conditions, a large part is eliminated as such. The organic composition must be broken up, in order that the therapeutic effects may be obtained.

In *atoxyl*, the aniline, entering into the combination, does not take any active part; when poisonous symptoms occur they are those of arsenical poisoning. Martinet believes that all the effects attributed to the organic compounds can be obtained by use of the inorganic. Fowler, in 1796, had noted the action of the remedy in malarial affections. Arseniate of soda in large doses yields results in syphilis; the organic compounds have no specific action. In view of these facts, it is necessary to examine all the arsenical compounds, and to select those yielding the maximum of result with the minimum of danger. ·01 to ·02 g. (one-sixth to one-third of a grain) of arsenious acid produces a hæmatogenous and stimulo-nutritive effect; a larger dose is required for a parasiticide action, and is harmful, or, rather, very nearly harmful. Arseniate of soda is more brutal, as it were, than cacodylate, the action of which is prolonged and deliberate. For anti-parasitic action, organic compounds become dangerous, because the arsenic may be liberated in the organism in enormous doses. It is far better to use arsenious acid, which should be given thus:—Begin with a purgative, and then, for 24 hours, give a diet largely composed of hydrocarbons. Then give the drug in fractional doses, eight times a day, increasing gradually until a total of 48 m.g. (three-quarters of a grain) *per diem* is reached, and then gradually diminish. In this way the organism may be saturated with arsenic without risk of toxic troubles.—(*Revue de thérapeutique médico-chirurgicale.*)

A CASTOR-OIL PRESCRIPTION.

Wood recommends, in the *Journal de Médecine de Paris*, that castor oil should be given with glycerine, as its purgative action is thereby promoted.

℞ Ol. Ricini,
Glycerini - - - - - - - - āā ℥i.
Ess. Menth. Pip. - - - - ♏x.
Misce. Fiat. haust.

DUODENAL DYSPEPSIA.

René Gaultier has published a comprehensive study of duodenal dyspepsia, from which the following *résumé* has been made:—

I. *Functional Symptoms.*—Appetite usually maintained, increasing sometimes to polyphagia. Anorexia rare, tongue normal. Pain around or above the navel, spreading up to the left shoulder, or into the lumbar region, and appearing, as colic, two or three hours after a meal. Pruritus at night. Vomiting exceptional. Diarrhœa with greasy stools alternates with constipation and pale motions.

II. *Physical Signs.*—Abdominal tympanites; liver sometimes small and retracted, sometimes large and painful.

III. *General Symptoms.*—Earthy complexion; general malaise; hebetude;

loss of flesh; frequent glycosuria; urea often decreased. Examination of the fæces will show if there is absence or decrease of the bile and of the pancreatic secretion, or if there is, on the other hand, hypersecretion.

The *treatment* varies with the type of the dyspepsia.

A. *Diet.*—1. When hypersecretion of bile or pancreatic juice is present, milk, which lessens the action of the liver, pancreas, and duodenum, must be ordered.

2. When these secretions are diminished, they may be stimulated by giving fats in small amounts, albuminoids, farinaceous food, sugar, acids, spices, wine, and alcohol.

B. *Drugs.*—These may act upon the biliary, the pancreatic, or the duodenal secretion.

1. According to Albert Mathieu, drugs acting upon the secretion of bile should be divided into:—

(*a*) Slight cholagogues, such as Vichy water, Carlsbad water, sulphate of soda, phosphate of soda, chloride of sodium, ipecacuanha, croton oil, podophylline, aloes, rhubarb, senna, boldo.

(*b*) Powerful cholagogues, such as colocynth, terebinth, euonymine, terpine, chlorate of potash, calomel in large doses, benzoate of soda, salicylate of soda, ox-gall.

(*c*) Drugs decreasing the secretion of bile, such as iodide of potash, arsenical compounds, calomel in small fractional doses, antipyrine, codeine, etc.

2. Certain drugs act upon the pancreatic secretion and stimulate it, such as pilocarpine, nicotine, hydrochloric acid, lactic acid, sulphuric acid, chloral, physostygmine, mustard, pepper, etc.; or diminish it, such as bitters, morphine, cocaine, alkalies, strychnine.

3. The substances which act upon the secretion proper of the duodenum are not well known. Ferments (pancreatine, pancreato-kinase, eukinase) have been prepared artificially to take the place of those absent owing to defective function of the duodenum. The formation of secretin can be stimulated equally well by acting upon the mucous membrane of the duodenum by any acid which will convert prosecretin into secretin. Enriquez has accomplished this by enclosing 20 c.g. (3 grains) of tartaric acid in gluten. This coating is not acted upon by gastric digestion, but is at once removed by the juices of the small intestine. The results have been encouraging, but unfortunately the therapeutic indications for these substances are not as yet very clearly defined.—(*La Tribune Médicale.*)

TREATMENT OF INTESTINAL HÆMORRHAGES BY HOT ENEMATA OF GELATINE.

Michaelis, following the advice of his master, Professor Kroenig, has used hot enemata of gelatine in several cases of hæmorrhage from the bowels, some of which occurred in typhoid, and the rest were due to other causes. The bleeding was most effectively arrested, and, in some of the cases in which death resulted from other causes, the autopsy showed that no fresh hæmorrhages had occurred. The following technique is recommended:—Raise the foot of the bed, and inject into the rectum 8 to 16 fluid ounces of a 5-per-cent. solution of gelatine in water at a temperature of about 120° F. An irrigator should be used for the purpose, but only very moderate pressure must be used. Two to four enemata are given a day.—(*Medizinische Klinik.*)

Reviews of Books.

Alcohol and the Human Body: An Introduction to the Study of the Subject. By Sir VICTOR HORSLEY, F.R.S., F.R.C.S., M,B., B.S. (Lond.), Hon. M.D. (Halle), Surgeon to the National Hospital for the Paralysed and Epileptic; and MARY D. STURGE, M.D. (Lond.), Physician to the Birmingham and Midland Hospital for Women; with a Chapter by ARTHUR NEWSHOLME, M.D., F.R.C.P., D.P.H., Medical Officer of Health for Brighton. London: Macmillan & Co., Ltd. 5s. net.

THE advocates of total abstinence will, most assuredly, accord to this book a very effusive welcome, for it gives the stamp of approval to the crusade against the use of alcoholic drinks by three distinguished members of the medical profession. The opening chapters are exceedingly interesting, and sufficiently clear to convey an intelligent idea of the elements of physiology, and the effects produced upon the system by alcohol. In the later chapters, the effects upon the organs of the body, and the deplorable moral and social disasters consequent upon the excessive use of alcoholic beverages, are dealt with most effectively, and the arguments against the misuse of such beverages are altogether irrefutable. At the same time we are of opinion that the conclusions drawn from the effects of the abuse of alcohol are scarcely applicable, in a general way, to the moderate use of it in such diluted form as temperate people take it. The morbid conditions, described so clearly and carefully, are admittedly due to the intemperate use of the spirit. As Sir Dyce Duckworth has said, "any morbid conditions, which may be fairly attributed to alcoholic influence, in an appreciable degree, plainly indicate excessive consumption, or misuse during life. *Such changes are not found after death in the bodies of temperate users of alcohol.*" Excess of zeal has probably carried our authors further than the circumstances of the case warrant, but we would frankly approve of a pardonable fault in this direction, if it can in any way check the untold misery and wickedness due to intemperance. We have, therefore, no hesitation in heartily recommending the book.

A curious slip, which will doubtless be corrected in a future issue, appears on p. 117, where 7 is given as 20·7 per cent. of 70.

NOTES ON NEW EDITIONS.

A Text-book of Pathology. By FRANCIS DELAFIELD, M.D., LL.D., Emeritus Professor of the Practice of Medicine, College of Physicians and Surgeons, Columbia University, New York, and T. MITCHELL PRUDDEN, M.D., LL.D., Professor of Pathology and Director of the Department of Pathology, College of Physicians and Surgeons, Columbia University, New York. Pp. 1058. London: Baillière, Tindall & Cox. 25s. net.

THE eighth edition of Professor Delafield's excellent text-book of pathology will be heartily welcomed. The present edition has been thoroughly revised, and brought up to date by Professor T. Mitchell Prudden, who has had, in his work, the advantage of the assistance of several of the best-known pathologists in America. As, hitherto, there is a special section dealing with post-mortem examinations, and the methods of preserving and examining diseased tissues. This is included in Part III., and is now to be found at the end of the book. The first portion of the volume deals with general pathology, and the second with the special pathology of the various organs. The book is especially well illustrated, and many of the plates are artistically coloured, those showing the changes in the morphology of the blood, and the lesions of ganglion cells, stained by Nissl's method, being the most striking. We consider the volume one of the best of its kind as a reference book for students of pathology.

Text-book of Ophthalmology. By Dr. ERNST FUCHS, Professor of Ophthalmology in the University of Vienna. Authorised translation from the eleventh revised and greatly enlarged German edition, with numerous additions by ALEXANDER DUANE, M.D., Surgeon, Ophthalmic and Aural Institute, New York. Pp. 908. London: J. B. Lippincott Company. 25s. net.

FOR a very considerable time, Professor Fuchs' book on ophthalmology has been universally accepted as one of the best standard works on the subject. Since the last English edition appeared, four German editions have been issued, and Ophthalmologists in England and America must indeed feel indebted to Dr. Alexander Duane for translating and presenting to us so admirable a book as that which corresponds with the eleventh German edition. Dr. Duane has himself added a great deal of useful new matter and a few helpful illustrations, all of which are carefully indicated. We note particularly the excellent sections dealing with the pathology of iritis, glaucoma, and sympathetic ophthalmitis, and there is an exceedingly practical section dealing with the question of the compensation which may be fairly claimed for injuries to the eye. We confidently recommend the treatise to all those interested in the subject of ophthalmology.

Hernia: Its Etiology, Symptoms, and Treatment. By W. MCADAM ECCLES, M.S., F.R.C.S., Assistant Surgeon to, and Demonstrator of Operative Surgery at St. Bartholomew's Hospital. London: Baillière, Tindall & Cox. 7s. 6d.

THE third edition of this well-known monograph retains unaltered the size and general scheme of the volumes. The practical nature of the treatment suggested, which has hitherto characterised the work, has been maintained. Mr. McAdam Eccles considers that, with the greatly increased number of operations now practised for the relief of hernia, treatment by truss is apt to be neglected to the great discomfort and possible danger to the patient. He therefore, wisely, as we think, devotes much attention to the non-operative treatment of hernia.

The practitioner will still find in this book the best and most practical brief account of the treatment of this common and distressing malady.

"First Aid" to the Injured and Sick: an Advanced Ambulance Handbook. By F. J. WARWICK, B.A., M.B., Lecturer and Examiner on Ambulance, Home Nursing, and Hygiene to the London County Council, and A. C. TUNSTALL, M.D., F.R.C.S., Surgeon to the French Hospital. Fifth edition, revised and enlarged. Bristol: John Wright & Co.

THE fact that this little work has reached a fifth edition in seven years testifies to its popularity and success. The new edition maintains the general character of the volume as a concise and well-illustrated handbook. The chapter on "Transport of the Sick and Injured" has been amplified, and some new illustrations have been added, whilst some of the older illustrations have been replaced by improved ones.

Aids to Surgery. By JOSEPH CUNNING, M.B., B.S., F.R.C.S., Surgeon to the Victoria Hospital for Children. London: Baillière, Tindall & Cox. 4s. net.

WE are pleased to welcome the new edition of this little work, which contains the generally accepted facts of surgery presented as briefly and succinctly as possible, in order to assist students in preparing for examinations. It is a veritable *multum-in-parvo* of surgery. The new edition has been carefully revised, and brought thoroughly up to date, the most noticeable alterations being found in the sections devoted to "Gall Stones" and to "Diseases of the Pancreas," which have been entirely rewritten.

A Manual for Hospital Nurses and Others engaged in attending on the Sick. By ED. J. DOMVILLE, L.R.C.P., M.R.C.S., Surgeon to the Royal Devon and Exeter Hospital and to the Exeter School, Lecturer and Examiner to the St. John's Ambulance Association. London: J. & A. Churchill. 1s. 6d. net.

THAT this little book has reached the ninth edition is the best testimony to the fact that nurses find it very useful. It does not go deeply into any subject, but concisely sums up, under many headings, the chief points in ordinary nursing duties, and gives directions for carrying out treatment by the nurse.

The incubation table in Part II. will be found most helpful and useful, and the appendix contains some excellent recipes for sick cookery, a table of weights and measures with the terms used in prescriptions, and a good glossary.

There are, however, two points in the first part of the book which seem to have escaped the Author's notice in making a new and up-to-date edition. (1) Under "bed-making" it is not necessary to advise nurses to regulate bed-clothing according to the season in case "a chance visit to a ward at night" would find "portions of patients' wearing apparel being heaped on the beds in winter, or the floor strewn with superfluous blankets in summer." Now that every hospital has regular night nurses, and patients' clothes, are, as a rule, put out of the patients' reach at night, this hardly applies. (2) It is not made clear in "washing patients" that a daily washing all over is necessary. These are, however, details which can be easily corrected in the next edition.

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Notes by the Way.

The Research Defence Society.

WE took occasion to outline the case for vivisection a few months ago when commenting on the Battersea "brown dog" incident. The subject is brought up again by the inauguration of the Research Defence Society, formed "to make generally known the facts about experiments on animals in this country," and Lord Cromer's speech at the opening meeting. There are, of course, as Lord Cromer pointed out, extremists who beg the whole question by starting with the assumption that vivisection, with whatever humanity conducted, is a means which no end can justify because it is wrong, absolutely and without qualification, to destroy animal life. With such opponents the vivisectionist can only argue, if at all, by the process of *reductio ad absurdum*, by pointing out, for example, that the destruction of animal life is involved in such simple operations of daily life as the use of an antiseptic dentifrice, or even the drinking of a glass of water. Their objections, therefore, may be ignored; and we may pass on, as Lord Cromer did, to the two graver and more specific charges against the experimentalists, which are :—

1. That they have never, by means of vivisection, discovered anything worth discovering.
2. That their methods inflict unnecessary pain.

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The Case for Vivisection.

THE answer to the former allegation might easily take the shape of a list of remedies and operations for various diseases and injuries, and of definite discoveries of the conditions in which specific infections are disseminated, for which we are indisputably indebted to the experiments denounced. Lord Cromer, without attempting to make a complete catalogue, cited several conclusive instances: notably malaria, Malta fever (the origin of which was ascertained by experiments on monkeys), and the antitoxin treatment of diphtheria, since the introduction of which the proportion of fatal cases in the Metropolitan Asylums Board's hospitals has fallen from 28 to 2·8 per cent. In the case of malaria, it is true, the question has been raised whether vivisection really had anything to do with the discovery of the instrumentality of the mosquito in carrying the infection; but Professor Osler's evidence before the Royal Commission settles the point. The question addressed to him was not: Was the discovery directly due to experiments on animals?—but: Could the discovery have been made without previous experiments on animals? His answer was: "Never. The men who made these investigations spent their lives in the laboratories, and their whole work has been based on experimentation on animals." Which means, of course, that vivisection has an indirect, as well as a direct value, and that our indebtedness is general as well as particular. We owe to it, not merely a few antitoxins, but an all-round advance in physiological and pathological knowledge which is continually being reflected in some fresh development of the arts of medicine and surgery. This surely is a sufficient reply to those who taunt the vivisectionists with not yet having found a cure for cancer. The discovery of that cure, if it should ever be made, will almost certainly be due, as Lord Cromer said, "not to observation, but to the experimental method."

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The Charge of Cruelty.

As regards the allegation of cruelty, the best answer is to call for the evidence. The evidence that is forthcoming is generally found to relate to cases that occurred a long time ago. Professor Starling told the Royal Commission that he had been engaged in the study of experimental physiology for seventeen years, and during the whole of that period had never seen pain inflicted on a cat, or a dog, or even a rabbit. Many other competent witnesses could doubtless be found to testify to the same effect. The inference is not to be drawn, of course, that there is no need for safeguards or restrictions, or that experimental physiology is everybody's business. The experimentalists themselves will agree that vivisection should be the work of properly trained and well-qualified investigators possessing distinct manipulative skill. Such men are not only likely to cause less pain to the animals than others, but they are also more likely to arrive at results of greater value to the physician and the surgeon.

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Tuberculosis in Ireland.

A VALUABLE account was lately printed in the *Times* of the good work being done, under the auspices of Lady Aberdeen, by the Women's National Health Association of Ireland in combating the ravages of tuberculosis. Ireland is the one part of the United Kingdom in which tuberculosis is on the increase; and it is therefore desirable that the laity there, as well as the doctors, should recognise that it is a disease generally preventable by healthy habits and conditions of life. Lady Aberdeen's travelling tuberculosis exhibition, which has already visited over sixty Irish towns and been visited by 700,000 people—about one-sixth of the total population of the country—was happily conceived, and is doubtless widely disseminating a much-needed knowledge of the elements of hygiene, though it is too early to examine hospital statistics in quest of proof of the utility of its services. If the association only supplied a reason for cultivating cleanliness to people who, according to the reports of travellers, do not love the virtue overmuch for its own sake, or regard it as its own reward, there will be ample grounds for gratitude; and, of course, it is doing a great deal more than that.

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The Need for Legislation.

THERE is little doubt, however, that the efforts of the association will require to be supplemented by the activity of the Legislature; and some of the directions, in which the Legislature might profitably bestir itself, can easily be indicated. Whether it ought to insist upon the compulsory notification of tuberculosis is a moot point, on both sides of which there is a good deal to be said. It is imperative, however, that it should insist upon housing reform, for the hovels of the Irish peasantry are generally dark, filthy, and ill-ventilated, and in all respects favourable to the culture of pathogenic organisms; and there are also the strongest reasons for insisting upon a more vigorous crusade against tuberculous cows. That point was made in Dr. Bulstrode's lecture at the Royal Institution on

"The Past and Future of Tuberculosis." Recent research, Dr. Bulstrode said, discredited the idea that the dried sputum of tuberculous patients was the most dangerous source of infection, and favoured the view that the bacillus was more frequently introduced into the system through the intestines in food, whether in the form of milk or meat. If that is so, the cow is doubly the enemy, and the case for rigorous inspection is clear—the more so, indeed, seeing that delicate persons, suspected of tuberculous tendencies, are commonly counselled to eat more meat and drink more milk than usual. For, though homœopaths might argue that the more tuberculous the meat and milk taken in such circumstances the better, they will not get reasonable members of the profession to agree with such theories.

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Mental Breakdown.

DR. ROBERT JONES'S article in this number of THE PRACTITIONER has an obvious bearing on a burning question of the day, the medical inspection of school children. The danger of mental breakdown is more likely to be greater where the reputation of teachers depends upon the "results" which examiners attest. Many recent actions and discussions bear witness to the interest aroused in the subject in the minds not only of local authorities but also of legislative administrators and medical practitioners; and Dr. Jones's paper will help them all to realise the importance of the new departure taken by the Board of Education. The article, to which we wish to draw special attention, treats of matters of vital concern to medical men and all persons responsible for, or interested in, the well-being of the rising generation.

Practical Notes.

RAYNAUD'S DISEASE.—This disease is due to a disturbance of the peripheral blood-vessels in the fingers, toes, nose, and ears, and is of vaso-motor origin. The condition is characterised by three distinct grades of intensity, viz.:—1. A local syncope. 2. A local asphyxia. 3. A local or symmetrical gangrene. In all cases, the first condition is present, sometimes the second follows, the third rarely appears.

The local syncope is most frequently met with affecting the extremities, and producing the condition usually known as dead toes or dead fingers, one or more toes or fingers may be affected and, occasionally, the entire foot or hand. The disturbance is brought on by exposure to slight cold, or in consequence of some emotional disturbance or excitement. The fingers or the toes become quite white and cold, and may remain so for many hours, although, as a rule, the condition passes off in an hour or so. A reaction usually follows, when the fingers and toes become very red and burning hot. It is an extraordinary thing that the pallor may remain in one or two fingers, while the adjacent ones may be quite red. Frequently, the stage of local asphxyia is reached, in which the skin of the fingers, toes, and ears becomes swollen and intensely congested; in the worst cases, the fingers become livid. This is due to the fact that the capillary circulation almost ceases. The patient sometimes suffers excruciating pain, or, on the other hand, there may be anæsthesia in the affected part. These attacks sometimes recur for years, and are brought on by exposure to cold, sometimes they even follow mental and gastric disturbances. As a rule, the attacks are most frequent in the winter or during cold weather, and, apart from them, the patient may appear in the best of health. In the worst cases of Raynaud's disease, symmetrical gangrene follows in the skin of the fingers and ears. Sometimes a terminal phalanx of a finger or toe becomes cold, dark in colour and quite anæsthetic, and the skin may slough away. In severe cases, the greater portion of a finger, the tip of the nose or the margins of the ears, may be lost. The condition is much more severe when children are attacked by the disease. There is an extraordinary case on record in which a child, three years of age, lost, in this way, both arms above the elbow, and the leg below the knee. There was a spot of gangrene on the child's nose as well. Spontaneous amputation of the limbs occurred, and the child recovered. There are other conditions sometimes associated with Raynaud's disease, the most frequent of these being paroxysmal hæmoglobinuria; more rarely cerebral symptoms appear, such as mental torpor, epilepsy, transient hæmiplegia, and peripheral neuritis.

TREATMENT OF RAYNAUD'S DISEASE. — The patient should be instructed to avoid undue exposure to cold, and to take particular care to dress very warmly in cold weather, using especially thick woollen gloves, thick socks or stockings, and stout wide boots. He should wash in warm water only, and eat plenty of butter and fat. From time to time, the patient should take small doses of iron and cod-liver oil. When an attack occurs, the part or parts should be carefully wrapped in cotton-wool; friction, with a stimulating liniment, such as linimentum camphoræ, is useful if the patient can stand it. The galvanic or constant current may be applied. The affected limb should be immersed in warm salt water, one electrode should be placed over the patient's spine and the other in the water. Cushing's treatment is to encircle the part with a pneumatic tourniquet, in order to shut off the arterial circulation for a few minutes. The tourniquet is then released, the affected members then become bright red, owing to a sudden vasodilation. In the more severe cases, the tourniquet may have to be frequently applied before the spasm in the arterioles can be overcome. In elderly persons, who have constantly repeated attacks of painful paroxysms with threatening gangrene, small doses of opium, combined with extract of hyoscyamus, may be given twice or three times daily.

FRECKLES.—Some dermatologists include freckles, lentigo, or ephelides under the heading of sexual pigmentation. Freckles are divided into sun freckles and cold freckles, assuming that the former are really due to the sun's rays. Freckles rarely appear before the eighth or ninth year, and are more abundant in those children who have red hair and a delicate skin, although, of course, they do occur in those with dark brown or black hair. They do not, as a rule, completely disappear in the winter. The affection, however, tends to disappear as age advances, and is infrequently found in adult life. They are an example of excess of pigment in the skin, a condition known as hyperchromasia, in contradistinction to achromasia, or leucodermia, in which there is a deficiency of pigment in the skin. Freckles usually appear on exposed surfaces, such as the cheeks and nose, sometimes on the backs of the hands, and very occasionally on covered parts, such as the back and buttocks. The pigment is deposited in the epithelial cells in the deepest layers of the epidermis.

TREATMENT OF FRECKLES.—As a rule, no treatment is called for, but in some cases, when the disfigurement is great, local treatment may be indicated. As freckles are produced by the actinic and not by the heat-rays of the sunlight, they may be prevented from appearing on the face by the wearing of a red or brown veil. An irritant may be applied to the skin which will cause the epithelial cells to exfoliate, and the pigment to consequently come away. A useful application is mercuric chloride, 1 per cent. in alcohol. This may be applied daily until irritation is produced. Unna recommends the following ointment:—

℞	Unguenti Zinci	pt. 30.
	Bismuthi Subnitratis	pt. 1.
	Olei Olivi	pt. 5.
	Adipis Lanæ	pt. 5.
	Hydrargyri Ammoniati	pt. 2½.
	Solutii Hydrogeni Peroxidi (10 per cent.)	pt. 20.

Misce. Fiat Ung.

In Vienna the following ointment is recommended:—

℞	Hydrargyri Ammoniati	pt. i.
	Bismuthi Subnitratis	pt. i.
	Barii Sulphatis	pt. i.
	Vaseline	pt. 30.

Misce. Fiat Ung.

Preparations, Inventions, etc.

"TABLOID" PHENOL AND MENTHOL COMPOUNDS.

(London: Messrs. Burroughs Wellcome & Co.)

The composition of this "Tabloid" is as follows:—

Phenol	gr. ¼.
Menthol	gr. ½.
Oil of Cajeput	min. i.

The gelatine envelope preserves the contents from the action of the atmosphere, and the size and shape certainly facilitate swallowing. From the composition, it will be readily seen that, besides acting as a gastric stimulant, they are antiseptic, and in this they minimise, or even arrest, the fermentation which so frequently occurs in a dilated stomach. The "tabloids" will be of service, therefore, in cases of flatulence and fermentative dyspepsia. When the ingredients get into the small intestine, they exercise a distinct carminative effect, and, in this respect, they prevent griping, which is so frequently present with dyspepsia. The "tabloid" is supplied in boxes, each containing 25, and one or two may be conveniently swallowed whole with a little water after food.

SCHERING'S SYNTHETIC CAMPHOR.

(London: Messrs. A. & M. Zimmermann, 3, Lloyd's Avenue.)

This synthetic preparation of camphor has, in Germany, been very carefully tested and compared with the Borneol Camphor, and the conclusion arrived at is that "Synthetic camphor differs only very slightly from the natural product in optical action, but it is absolutely identical with the latter in all other physical and chemical properties." It has also been tried therapeutically in place of the natural camphor, and no differences were observed after either internal or external application. It may be employed, therefore, in cases in which the natural camphor is indicated.

CHRISTIA ACCOUCHEMENT SHEET.

(London: Messrs. T. Christy & Co., Old Swan Lane.)

We have received from Messrs. T. Christy & Co. a "Christia Accouchement Sheet," which they have recently introduced as a substitute for the ordinary rubber sheet. The material of which it is made is strong "Christia" and is proof to hot and cold water, oil, spirit, and grease. It has the great advantage, too, that it is unaffected by time and climate. The price of the sheet is one shilling and ninepence, and this, considering its advantages, is exceedingly moderate, and well within the reach of the majority of patients.

"MEMBROIDS."

(London: Messrs. Evans, Sons, Lescher and Webb, Ltd.)

We have received from Messrs. Evans, Sons, Lescher, and Webb three samples of their "Membroids" or drugs in membrane. The "Membroids" supplied are those of aspirin, 5 grains in each membrane, ipecacuanha, 5 grains in each membrane, and creosote, 2 minims in each membrane. These "Membroids" do not in any way disturb gastric digestion, or upset the stomach, for each consists of a capsule on the outside, which resists the action of the pepsin-hydrochloric acid of the gastric juice, but which is readily digested by the trypsin-sodium carbonate of the pancreatic juice; the contents of the membroids are, therefore, liberated, and act in the small intestine. We consider that this is an extremely ingenious method of administering drugs which are likely to irritate the stomach and cause nausea and vomiting.

NEW PREPARATIONS.

(London: Messrs. Parke, Davis & Co., Beak Street,
Regent Street.)

Analgesic Balm.—The small tube of analgesic balm submitted to us consists of a combination of methyl salicylate, menthol, and lanoline. This preparation is to be applied to the *unbroken* skin, and is exceedingly useful in relieving pain such as occurs in trigeminal and intercostal neuralgia, sciatica, migraine, and frontal headache. The balm is supplied in small collapsible tubes, so that quite small quantities may be readily applied.

Gelatin-coated Pills. Aloin and Phenolphthalein Compound.—These pills have the following composition:—

Aloin $\frac{1}{4}$ grain.
Strychnine $\frac{1}{80}$ grain.
Ext. Belladonna $\frac{1}{12}$ grain.
Pulv. Ipecac. $\frac{1}{16}$ grain.
Phenolphthalein $\frac{1}{2}$ grain.

They are most useful in cases of chronic constipation. The gelatine coating the pills completely conceals the taste of the contents, and the pills operate promptly and thoroughly, without producing any discomfort. The pills are supplied in bottles of 100 and 500.

HEMISINE.

(London: Messrs. Burroughs Wellcome & Co.)

Hemisine is one name given to the active principle of the medulla of the suprarenal capsule. The preparation submitted to us has been physiologically standardised by the observation of its effects on the arterial blood pressure. It is supplied in hermetically sealed phials each containing ·5 cc. of 1 in 1,000 solution. It is sterile. When diluted, normal saline solution should be used, except in the case of the eye, when distilled or boiled water is far preferable. Soloids of sodium chloride are supplied with the Hemisine.

Hemisine, however, is distinctly contra-indicated in hæmorrhage from the lung, and in cases of cerebral congestion and hæmorrhage. It only tends to aggravate these conditions.

MATTONI GIESSHUBLER.

(London: Messrs. Ingram and Royle, Ltd., 26, Upper Thames Street, E.C.)

The Giesshübler is a pure alkaline sodaic spring, and the water obtained from it is not only an excellent beverage, but a useful medical remedy. It forms the favourite beverage of the patients at Carlsbad, and, in the form before us, may be readily obtained at home. It contains a large proportion of sodium bicarbonate, and a smaller proportion of bicarbonate of calcium, magnesium, and potash. Its effervescence is quite natural, and is due to free carbonic acid gas. If stored in cool places, experience has shown that the Giesshübler water will keep unchanged for years. It is consequently suitable for exportation. It will be found to be a useful remedy in some of the catarrhal affections of the stomach and intestines associated with dyspepsia, jaundice, pyrosis, vomiting, and diarrhœa, and at the same time it is a useful diuretic. The water is supplied in large and in small bottles.

THE PRACTITIONER.

SEPTEMBER, 1908.

MALIGNANT OBSTRUCTION OF THE ŒSOPHAGUS.[1]

BY LAWRIE McGAVIN, F.R.C.S.,

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THE condition of œsophageal cancer is one which is perhaps more familiar to the members of hospital staffs than to the majority of general practitioners; indeed, even in hospital practice, œsophageal cancer is not so frequently met with as to be classed as common. At present the cause of it is, like that of cancer elsewhere, unknown, and the treatment is therefore almost entirely palliative. At the same time I hope to describe such operative treatment as has been attempted.

Of the three cases to which I propose to refer, two were very similar, the growth being situated in the upper portion of the tube; both were ring carcinomata, and neither would admit of the passage of solid food except with some difficulty. The disease in the elder patient was rather the more advanced, and was complicated by the presence of a large mass of secondary glands above the right clavicle. These glands have grown steadily larger since admission, and soon after their appearance, pain began to affect the arm, and in a short time paresis commenced, and was followed by almost complete paralysis of this arm. In neither case could the growth be seen or felt from the mouth. In the younger of the two patients, it was found to be 8·5 inches from the teeth, and 1·5 inches in length; while in the elder, it was situated 5·5 inches from the teeth, and was 3·5 inches in length: either of them would just admit a No. 13 bougie, and salivation was fairly marked in both. The third case was one in which the growth was situated at the bifurcation of the trachea; it was found to be rather more than 2 inches in length, and admitted a No. 12 bougie with some difficulty. Solids in this case could not be swallowed at all, nor had they been for some days.

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[1] A lecture delivered at the London School of Clinical Medicine, Greenwich.

Carcinoma of the œsophagus, which is the commonest of all diseases occurring in this organ, is said to account for about 5 per cent. to 6 per cent. of all carcinomata, and to affect the male sex in about 73 per cent. of cases. Although much more commonly met with after the age of from 45 to 50, it has been seen as early as 19 by Heimann, and 23 by Stewart (curiously enough both of these cases occurred in girls), and I have myself seen a case in a young girl of 21. Seventy-one per cent., however, represents the proportion of cases occurring after 50 years of age.

There can be little doubt that such a great disproportion in the occurrence of cancer in the two sexes in a structure, which is not in any way modified by sexual development, is a very remarkable fact, and would suggest the presence of some factor depending on habits of life in the male, which are not so commonly found in the female sex. But, whatever theories we formulate to account for the disease, it is perfectly obvious that none are satisfactory. Whether we consider the question from the embryonic point of view, or attribute the disease to local irritation, it remains one of pure theory, since nothing has been proved regarding the embryonic causation of cancer, nor is there any reason why irritative causes should be more at work in the male than in the female, when it is remembered that the two sexes suffer equally from non-malignant diseases of the œsophagus which might serve as a starting point of cancer: indeed local diseases other than cancer are here very rare. It yet remains to be proved that syphilis is not the same important factor in the generation of cancer of the œsophagus, as it is in the tongue. I believe that if sufficient examinations were made in syphilitic patients with the œsophagoscope, leucoplakial patches would be found in the mucous membrane from time to time, similar to those we know so well on the tongue, where in themselves they often give rise to no discomfort, and yet in time result in cancer; and indeed such leucoplakia have been noted by von Hacker and others. And in this connection, I would observe that in my third case, the posterior pillars of the fauces were scarred and adherent to the tongue, and that there were old cicatricial bands on the soft palate pointing to syphilitic ulceration. To the general practitioner, the question must be one of practical surgery rather than that of theory and experimental research.

There has been a remarkable difference in the opinions, expressed by various writers from time to time, as to the commonest site of cancer of the œsophagus, but, at the present time, the general consensus of opinion points to the level of the bifurcation of the trachea as the more commonly affected situation. This is borne out by the observations of von Hacker, who gives the frequency in 100 cases as being represented by 10 cases in the cervical region, 40 at the bifurcation of the trachea, and 30 at the lower end; the remaining 20 appear to have arisen in the cardiac end of the stomach, and should, therefore, not have been included in the statistics of œsophageal but of gastric cancer. Since these common sites of origin are the narrowest and most fixed portions of the tube, it stands to reason that irritation must play some part in the process of cancer formation, just as it does in the case of the lip, the tongue, the rectum, and the cervix uteri. But wherever the disease occurs, seeing that it is commonly a squamous-celled epitheliomatous ulcer, it is reasonable to suppose that it starts as the result of some preceding lesion causing a denudation of the epithelium at one of these spots. Such a condition may be brought about by comparatively rare lesions: to syphilitic ulceration I have already referred; tuberculous ulceration may also occur, and, at the lower end of the tube, peptic ulcers have been seen: then there are the fibrous scars resulting from the impaction of foreign bodies, the swallowing of caustic alkalies or corrosive acids, or the localised chronic inflammations of the mucous membrane in alcoholics. In support of the irritation theory, Ritter draws attention to the occurrence of carcinoma in the vicinity of œsophageal diverticula.

The manner in which cancer affects the œsophagus is very similar to that which it exhibits in the case of other tubular structures, *i.e.*, it tends rather to spread round the tube than along it; it is also usually limited in its superficial invasion although not invariably so, for just as a cancer of the pylorus is seldom seen spreading into the duodenum, so one rarely sees cancer of the œsophagus transgressing the boundary line of the cardiac orifice of the stomach and passing into that organ; the reverse, however, may occur, and a gastric cancer may become œsophageal.

The ring tendency of such growths is highly suggestive of the probability of increase by local contact, and this is further suggested by the fact that, occasionally, nodules have been found which looked as if they had arisen by contact from the mass first formed, coalescence of which would in time have produced a ring carcinoma: and by some writers it is maintained that portions of such carcinomatous tissue, when broken off, are capable of originating fresh growths lower down in the œsophagus by inoculation. I have not, however, personally seen this phenomenon. Metastases are also extremely rare in squamous epitheliomata, but they do occur; and I have seen a squamous epithelioma of the tongue giving rise to secondary deposits in the brain and heart.

Glandular affections would appear to occur rather later than in some other situations, but it must not be forgotten that the glands in connection with the œsophagus are deeply seated, and therefore may be overlooked although enlarged. Those involved in disease of the upper end of the tube are the lower group of the deep cervical chain; and, in the case of the lower and middle sections, the drain is towards the posterior mediastinal glands.

Now, although the diagnosis of œsophageal carcinoma is, as a rule, a very simple matter (since a stenosis in elderly persons, who are otherwise healthy, is little likely to be due to anything else), it should be arrived at only after careful consideration; for, in a small proportion of cases, the symptoms may be due to some other condition which may lead one astray, and end possibly in a disaster. The earliest and practically the only sign of trouble at first is of course dysphagia, and this comes on so gradually, that the patient is hardly aware of it, so that the trouble is often far advanced by the time he comes under observation.

The first concern, then, will be to find out the cause of his dysphagia, and, while considering the possibility of cancer in the first place, the other less probable causes must be borne in mind; and that this may be done systematically, I would advise that in the first place the conditions, which may arise *within* the lumen of the œsophagus, be considered; then those originating *in the wall of the tube itself;* thirdly, the various ways in which pressure may be brought upon the œsophagus *from the outside;* lastly, the element of neurosis must be excluded.

It will at once be obvious that causes arising within the œsophagus are distinctly rare ; the impaction of a foreign body need not be considered, since the source of the dysphagia would, in such a case, be perfectly clear. The only other condition to be considered, is the presence of a pendunculated tumour. Such polypoid tumours are also rare ; they are commonly fibromata, which, although growing from the submucosa and covered by mucous membrane, may for convenience sake be considered as arising within the lumen. They usually spring from the upper portion of the œsophagus, and may attain considerable length, and although at first they give rise to little inconvenience, later on they may cause dysphagia and spasmodic vomiting, and, being at times cast up into the mouth, may be a source of danger from suffocation. The chief point to be remembered is, that they cause no bleeding, or fœtor of the breath, and that the vomiting is spasmodic, and not a simple regurgitation of food of which it is often quite independent.

Considering the causes of dysphagia arising in the walls of the œsophagus, there must be remembered the occurrence of myomata, those tumours arising in the unstriated muscular fibre of the œsophagus, and of very uncommon occurrence. Originating, as a rule, lower down than the fibromata, they give rise to no vomiting, and, like the fibromata, are unaccompanied by bleeding, or fœtor. Again, abscesses may form in the wall of the tube as the result of injury by foreign bodies, the rough passage of bougies, or the ulceration of the tracheal or laryngeal cartilages due to syphilis or tubercle ; they are, however, rare, and the constitutional disturbance of such lesions would give an indication of the inflammatory character of the trouble. Much more important is the occurrence of actual non-malignant stenosis due to preceding pathological changes in the coats of the tube. It is, as you are aware, a comparatively common condition, and originates chiefly from traumatic sources, very few cases resulting from previous local disease, such as syphilis, tubercle, diphtheria, and phlegmonous inflammation. Thus, of Billroth's 270 cases collected in his clinic during a period of 10 years, 17·7 per cent. were stenoses due to caustic fluids. Of the other cases collected in the same hospital during the same time, 26·6 per cent. were of the same nature, and, in both collections, the remainder were almost all cases of carcinoma.

Lastly, considering the causes producing pressure from without, some of them will be found to be very important; thus pressure may be brought upon the œsophagus in the cervical region by the chronic abscess resulting from a cervical caries; by abscesses in connection with perichondritis of the larynx or trachea; by masses of tuberculous glands which may be taken for secondary glands, the stenosis being regarded as a primary malignant condition; and by tumours arising from the cervical spine, and occasionally by the presence of a large pharyngeal diverticulum.

In the mediastinal course of the œsophagus there is the possibility of aortic aneurysm, lymphadenomata, and other glandular tumours, mediastinal gummata, actinomycotic growths, hydatid cysts, and sarcomata, all of which may press upon, and often seriously displace, the œsophagus.

Now, if the list is narrowed down to those cases, which are uncomplicated by swellings in the neck or elsewhere, by outward signs of thoracic trouble, pyrexia, bloody expectoration, or by any sign of congenital or acquired syphilis, or trauma, and in which *only* the sign of dysphagia is present, it is necessary to solve the following questions:—Is there actual obstruction present? If so, where is it situated? Is it innocent or malignant? If it is innocent, what is its cause, and is it dilatable? In any case, what are its length, and calibre?

In solving the first of these questions, the methods of diagnosis of œsophageal stenosis are always unpleasant to patients, it is well, therefore, to be patient and sympathetic with them, and leave the more drastic methods of investigation till the last. As to making sure of the fact of obstruction being actually present, if what I said about cancer in young girls is remembered, and also that it is by no means uncommon to meet with cases of hysterical dysphagia in this class, the importance of my point will at once be seen. It is not that the prognosis and treatment in young women are more satisfactory than in adult men, but rather that we should be saved the ignominy of making so grave a professional error as that of diagnosing, as a hysterical condition, that which will later turn out to be a fatal malady.

Commence then by a laryngoscopic examination ; this may help us to see the upper end of a growth behind the cricoid, any displacement of the larynx, any tendency to paresis of the vocal cords, or, with a good light, possibly some bulging of the tracheal wall below the cricoid. If this should lead to no result, direct the patient to take a long breath, and pass the finger as far down the pharynx as possible, thus may possibly be felt what we have failed to see ; these two methods will, of course, only help where the upper end of the growth is projecting into the pharynx.

Next, try the patient's ability to swallow, and note the length of time it takes him to dispose of such a meal as a slice of bread and butter and a glass of milk. With a very narrow obstruction, the process will be a lengthy one, and one solid mouthful will require several fluid ones to help it down, a great deal of regurgitation taking place if care is not exercised. In the case of hysterical dysphagia, the mouthful will be *ejected* (not regurgitated) at once, even before it has reached the œsophagus, and this will be accompanied by a good deal of unnecessary gagging and retching. Where the obstruction is low down, owing to the accommodating elasticity of the œsophagus at lower levels than the cricoid, a dilatation of considerable magnitude, capable of containing a fair quantity of food, may take place above the obstruction, and consequently *regurgitation* (not vomiting, since it is the result of effortless expression) occurs at a later period, when the dilated part becomes over-distended.

Three methods are available for the purpose of ascertaining the situation of the obstruction ; they are the employment of radiography, the passage of sounds, and the use of the œsophagoscope. The first of these methods can only be utilised for demonstrating the situation of the obstruction ; it will not serve for measuring the length or calibre. It is untrustworthy if employed in the usual manner, as it affords only a faint shadow on the screen ; but if the œsophagus is first filled with a suspension of bismuth in mucilage, the upper limit of the obstruction may be noted on the screen, the patient being in the semi-recumbent position. The passage of sounds is the ordinary, and perhaps the most trustworthy method ; for, although by the use of the œsophagoscope the growth can actually be seen, and a small portion removed for examination, it cannot help with regard to the length and calibre of the obstruction; moreover, some skill is required for its manipulation and introduction, which can only be acquired by repeated use.

The sound, then, is the best instrument for ascertaining the site, length, calibre, and consistence of œsophageal obstructions. If, however, the latter is due to a laterally-displaced œsophagus rather than to a ring-like constriction, as it is at times, this can only be discovered by the œsophagoscope. The sounds which will best aid are those recommended by Symonds; they are made of flexible whalebone, having interchangeable olive-shaped metallic heads of graduated sizes, and to save time these are adjustable to either end.

Before commencing to sound the patient, let me call attention to one or two points which might otherwise be overlooked. In the first place, remember the approximate distances from the teeth, of the cricoid cartilage, the bifurcation of the trachea, and the cardiac orifice of the stomach, so that the position of the olive of the sound may at any moment be known. The first is roughly six inches from the teeth, the second ten, and the third sixteen. In certain conditions the passage of any instrument is contra-indicated, and in some, although not actually so, yet the greatest gentleness must be used, and only blunt-pointed sounds passed. The former class includes repeated sharp hæmorrhage and active acute inflammation of the œsophagus; the latter, advanced malignant disease and aortic aneurysm; and every precaution must be taken to discover the presence of such lesions before the passage of instruments is resorted to.

The passage of a sound is, as a rule, a simple matter, but at times one may fail to make it enter the stomach, even although the size of the olive may have been gradually reduced to something rather less than the probable diameter of the stricture; again, one may fail to pass it on one occasion, and, on a second, be successful with an even larger sound than that with which there was failure. The explanation of the first of these difficulties is to be found in the fact that, at times, there is a tendency to marked eversion of the edge of the tumour, the olive passing into the cup-shaped depression between it and the wall of the tube, the true lumen being very narrow, and situated close to the opposite wall rather than in the centre of the œsophagus. The second depends on the presence of a small pharyngeal or œsophageal diverticulum, which, from time to time, catches the point of the sound, without being large enough to give signs of its presence. These, however, are not common difficulties, and, as a rule, the first point of stoppage of the sound, after passing the cricoid, will represent the upper aperture of the obstruction. Note carefully the distance of this point from the teeth for future guidance, and withdraw the sound. Proceed to try sounds of diminishing diameter until one is found which will just pass through the obstruction without any great force; note the number of this sound on paper, and pass it well beyond the obstruction. Now withdraw the sound, till it is felt to be again caught by the lower end of the stricture, and note the distance of this point from the teeth. The exact length and calibre of the obstruction are now known, and the only points remaining to be determined are the nature of the trouble, and, presuming it is innocent, how far it is dilatable.

How is the nature of the obstruction to be found out? It may be said at once, that, in a perfectly symptomless case of dysphagia, without previous history, either the malignant nature must be assumed from the age of the patient, or the growth must be seen, and possibly a portion of it removed through the œsophagoscope for examination. In the majority of cases, the assumption will undoubtedly be correct, but by the latter method the diagnosis will be certain.

Now let us consider for a moment those cases, in which various symptoms other than dysphagia are present, and the respective value of such as diagnostic signs. First, pain may be said to be absent in the majority of cases of œsophageal cancer, especially in the earlier stages, and when present it usually points to advanced disease, since it is due to implication of nerves, erosion of bone, and peri-œsophagitis. Pain in distant parts, that is, in the lateral wall of the chest, the shoulder, the arm, or shooting into the ears suggests respectively, spinal erosion (especially when accompanied by herpes zoster), involvement of the brachial plexus by secondary glands, or extension upwards to the pharyngeal region, a rare occurrence. The expectoration of bloody saliva is important, and may originate from four different sources. Quite independently of cancerous obstruction, œsophageal varicosities are often seen in chronic alcoholics, a class notably prone to cancer of this part. These varicosities are liable to bleed from time to time, and just as rectal hæmorrhage in old people should always suggest the possibility of cancer, so œsophageal hæmorrhage should also suggest it. Again, it may come from a quietly leaking aortic aneurysm, from a papilloma of the œsophagus, or from the condition we are considering. In the first and third, it may be profuse, in the second and fourth, it is generally slight in amount, unless the aneurysm is on the point of rupture, or the growth has opened a large vessel. But the chief distinguishing mark of malignant disease here, is the fœtor of the saliva and breath, which is usually pronounced, and which is absent in the other causes.

Salivation must be distinguished from overflow of saliva. The latter is due to the filling up of the distended pharynx or œsophagus above the seat of stricture; the former is a glosso-pharyngeal reflex depending upon irritation of the pharyngo-œsophageal region by an ascending growth, as already stated, a rare event.

The adhesion of the tumour to surrounding structures gives rise to certain signs, of which the chief are dilatation or contraction of the pupil, and the occurrence of aphonial or dyspnœic attacks. The former depends, of course, on the early irritation and subsequent paresis of the pupilo-dilator fibres of the sympathetic nerve chain; and the latter upon the same factor as regards the recurrent laryngeal nerve. The pupillary change, which is only occasionally seen, may be met with in the case of a growth as low down as the third dorsal vertebra. The left recurrent laryngeal nerve, being in closer relation with the œsophagus than its fellow, is more often affected by the growth: these ocular and laryngeal changes are, however, only seen in cases which have arrived at an advanced stage.

The character of the breath, which is usually very fœtid, is an indication of putrefaction, and may therefore point to the presence of an œsophageal diverticulum; but it is, at times, very typical of cancer, and, in association with bloody saliva, which is absent in the former condition, is almost pathognomonic. Marasmus, as a sign of malignant disease, has been much relied upon by many writers: it depends, however, on many factors, and several other conditions may produce a like result. It is due to starvation, absorption of pus, hæmorrhage, sleeplessness resulting from pain, and, lastly, to toxæmia from the tumour itself, and the knowledge of its character. Thus it can hardly be said to be a sign of cancer, since it often points to other and obscure diseases: it is rather an evidence of malnutrition, and, where full meals are being taken, is a sign of grave import: thus, in a case recently under my care, it was thought to point to cancer of the intestine, no other sign being present; it, however, eventually turned out to be due to a pulmonary mycosis. In obstruction of the œsophagus, the cause of this marasmus is obvious; but, in other cancers, seeing that marasmus does not commonly accompany the superficial ulceration of malignant disease, it suggests secondary involvement of other organs, or the breaking down of, and absorption from, a large parent growth.

Considering the close connection of the vagus nerves with the œsophagus, it is a very remarkable fact that vagal symptoms are quite uncommon even in advanced cancer. Possibly they are commoner than literature would lead us to suppose; but they either have not been closely looked for, or, occurring in the quite late stages of the disease, have been attributed to sepsis or exhaustion. At any rate, few writers make any mention of them.

Now as to forcible dilatation in cancer, I would say most emphatically, avoid it! The danger of passing sounds into the œsophagus is in most cases slight, but it must not be forgotten that this organ has at times been perforated, and the possibilities depending on this accident are extremely serious. The cellular tissue of the neck may be injured, and a gangrenous cellulitis result; or, if in the thoracic course, a suppurative mediastinitis may be set up. Perforations into the pleura may give rise to an empyema; if into the left bronchus, septic pneumonia and gangrene of the lung; whilst, of all possible dangers, rupture of the sac of an aortic aneurysm is perhaps the most easily accomplished, the least expected, and certainly the most rapidly fatal. The same cautious introduction should be the rule in passsing the œsophagoscope as in the use of sounds. This instrument, which is of comparatively recent introduction, has so far been but little employed in this country; but like its congeners, Killian's bronchoscope and Straus's sigmoidoscope, it has rendered the greatest service not only in diagnosis but in treatment.

Œsophagoscopy was first introduced by Mickulickz about 14 years ago, and, since that time, both method and apparatus have been modified by Störk and others. By its means it is possible to see and examine the surface of any tumour, to remove foreign bodies or small pieces of growth for examination, and to make applications to the mucous membrane. Its method of employment is as follows:—

The patient is placed upon the operating table in a sitting position, and, the larynx and fauces having been sprayed with a 10 per cent. solution of cocaine, the patient's head being thrown well back, the tube is introduced. The patient is then placed gently on his back, the head hanging well over the end of the table, and the electroscope attachment is fixed in position. It is well to examine the patient when the stomach is empty, since any effort at vomiting may flood the tube and result in a waste of time. If such an accident should happen, the head must be lowered and the tube emptied and mopped out. By means of the electroscope the passage of the tube can be controlled, if it should meet with any obstruction from pathological displacements of the œsophagus.

Such examinations may be conducted without the aid of general anæsthesia, but are contra-indicated in any condition causing respiratory obstruction, as well as in those conditions of the œsophagus already mentioned.

As to the treatment of this condition; it may as well be said at once that it is in the highest degree unsatisfactory, since, in the present state of our knowledge, a cure is out of the question. But much may be done to relieve the patient's sufferings, although it is doubtful if the prolongation of life, in such circumstances, is desirable from the patient's point of view.

The question of how far œsophageal cancer is amenable to operative treatment for its removal is easily answered; it is not in any way suited to such treatment. It is true that it has been attempted, and, indeed, carried out by such leaders of surgery as Czerny and Mickulickz, when in the cervical portion; but the only effect was to stave off the evil day for 15 months in one case, and for 11 months in another; the post-operative mortality in 15 cases was 33 per cent., and eventually all died of recurrence. The reasons for the unsuitability of the œsophagus to operative treatment are fairly clear; the depth at which it lies, and the important structures which surround it are antagonistic to success; the very wide lymphatic drain renders complete extirpation improbable; reconstitution of the œsophagus, after resection of as much of it as will afford any promise of the latter, is impossible, and the best that can be done is the establishment of an œsophageal fistula through which the patient may be fed. Again, Czerny has shown that stricture at the site of resection is constant and intractable; and the danger of setting up a gangrenous cellulitis of the neck, suppurative mediastinitis, and secondary hæmorrhage is very great.

If, however, a case should be met with, in which it would seem to be justifiable to interfere, such as a young subject otherwise healthy, with a very limited growth, high up in the tube, and without obvious glandular invasion, the operator would do well to observe one or two rules. The mouth and teeth should be kept scrupulously clean for days before the operation; gastrostomy should be performed at least a week earlier, partly in order to avoid infection of the cervical wound by the passage of food during convalescence, and partly to provide a means of nourishing the patient should speedy recurrence follow operation. Tracheotomy or laryngotomy should be performed at the commencement of the operation, and the upper aperture of the larynx should be plugged to prevent the entrance of blood, where the growth involves the upper part of the œsophagus; the resection must go wide of the growth; and, if the latter is low in the neck, the distal end of the tube must be closed by suture and dropped back into the wound. A sharp look-out must be kept for the recurrent laryngeal nerve, which must be avoided, and, throughout the operation, every precaution must be taken to prevent the fouling of the wound by saliva.

Although the operation has been and can be done, it can only be one of relief, and it is doubtful if even this is secured, since the disposal of saliva is a constant trouble : either it must escape by a fistula in the neck, both ends of the tube being brought into the wound as performed by Graeve ; or it must be constantly spat out ; in either case its loss to the digestion is serious, and its discomfort to the patient unending.

The second form of operative interference is the performance of œsophagostomy without resection : it has the same objections as regards sepsis and loss of saliva, and is, of course, only available where the growth is high up. Where resection is impossible, and œsophagostomy is either inadvisable or is refused by the patient, two alternatives present themselves. They are permanent intubation and gastrostomy.

There is no doubt that permanent intubation is the method of election in nearly all cases of œsophageal cancer, and, in suitable cases, is a safe and simple one, giving great relief and staving off starvation almost to the very end. To Charters Symonds is due the credit of having introduced a method of such sound surgical value, and although modifications of it have been suggested by other surgeons, I doubt if they have in any way improved upon the original.

The tubes used for permanent intubation are probably well known by sight : they are formed from the same woven silk web of which catheters are made, and are generally used in two different lengths, viz., 4 and 6 inches. They are provided with lateral eyes, or else with a terminal opening, which renders them less liable to become blocked with food. Two forms of introducer are used. With the eyed tubes a flexible whalebone stylet is employed, which passes down to the apex of the tube : in the case of tubes having terminal openings, a tubular introducer, the lower end of which fits into the wine-filler end of the œsophageal tube, is used. To the tubes are attached a couple of silk cords ; these are for the purpose of extracting the tube, and after introduction are knotted at a suitable spot, and passed round the ear in order to prevent their being swallowed.

Having first ascertained, as already explained, the length and calibre of the obstruction, and the distance of its upper end from the teeth, a tube of suitable diameter and of sufficient length to pass well beyond the lower end of the growth is chosen. From the apex of the wine-filler of the tube, a distance is measured off on the silk cords equal in length to the distance from the teeth to the upper end of the obstruction. Here a knot is made which will serve to check the position of the tube when introduced. The tube is then mounted on the introducer, and, if a tube with lateral eyes is to be used, the whalebone stylet is passed through latter and its point pushed down to the extreme end of the tube. A turn of the silk cords is then taken round the introducer, and round the middle finger of the introducing hand, and, the tongue being well controlled by the forefinger of the other hand, the tube is passed down the œsophagus, and its point made to engage in the stricture. It is then pushed firmly but gently into position, the knot on the silk cords being now level with the teeth, and the cords being dropped, the stylet is used to hold the tube in position while the introducer is disengaged; the two are then withdrawn together.

The operation causes a little gagging and retching at first, but the patient soon becomes accustomed to the feeling of the cords in the throat. It is astonishing how quickly a patient who has lost weight will put on flesh after this treatment; and I may observe that the patient, whose tube I am about to change, has in the last three weeks added more than three pounds to his weight, and looks quite a different person.

The method has however its limitations. Thus it is not well suited to strictures at the upper end of the œsophagus for two reasons; partly owing to the presence of the cricoid, and partly to the propinquity of the pharynx, this is the most sensitive part of the tube, and irritation is often complained of here; again, the effect of the swallowing movements of the pharyngeal muscles is often to dislodge the tube, which is then regurgitated into the mouth.

A time comes when the tube, which has been increasingly difficult of introduction on each occasion of removal, cannot be replaced, the result being that resort must be had to gastrostomy. The tube, especially that with the lateral eyes, may become blocked and require removal; this however is a small matter as removal is easily accomplished; and, in any case, the block can often be overcome by gentle passage of the whalebone stylet. Occasionally, if the tube has been suffered to remain in position too long, and its substance has become macerated, the cords when pulled upon for removal, may cut out, the tube being left behind in the stricture: this may lead to trouble and require the use of the œsophagoscope for its extraction: fortunately, however, the tube is often so soft that its passage into the stomach by the use of a bougie is rendered an easy matter.

These tubes will remain comfortably in position for a matter of six weeks as a rule; it is safer, however, to change them more frequently, since accidents are thus avoided, and since a stricture may close gradually on a softened tube and necessitate the passing of a much smaller one on the next occasion. Sometimes, if care is not taken, the cords may become frayed on rough teeth, or be bitten through in the night and swallowed, and with them the tube itself may at times pass into the stomach. To prevent this the cords should be protected by a piece of fine rubber tubing tied on over them at the point of contact with the teeth. No alarm need be felt in case of such an accident, the tube is easily digested sufficiently to permit of its passage per rectum.

The removal of the tube is, as a rule, a simple matter; the end of the cord is held firmly in the left hand, and the right forefinger, being passed beneath it, is slipped along till its tip is in contact with the posterior pharyngeal wall; by using this finger as a lever, the tube can now be drawn upwards without much discomfort to the patient. It may stick slightly against the cricoid, but will at once be released if the finger is carried slightly backwards and upwards.

When a tube is first about to be introduced, a cardinal point to be remembered is, always to use that of the largest diameter which can be safely introduced: the longer one can stave off the final constriction of the fibrous ring, the better for the patient. Another point to be remembered, when once intubation has been commenced, is to impress upon the patient that on no account must he remove the tube himself: many hours may elapse before he can be attended to, during which time the growth may undergo very marked contraction.

As to when intubation should be performed: I think there is no doubt that it should be done before the difficulty of swallowing solids has become serious. It takes some little time for some patients to become accustomed to the presence of the tube and cords, and therefore this difficulty should be overcome before the question of feeding has become troublesome.

Finally, the time will come when the tube cannot be reintroduced, or when it has been reduced to such a size as to be practically useless, and the question of gastrostomy must be considered. Now gastrostomy is an operation which at one time became very unpopular owing to its high death rate; and even now, when that death rate has been largely reduced by better technique and earlier performance of the operation, it is not an operation that one would willingly submit a patient to except under compulsion: but, on occasions, it *must* be done just as colotomy must be done, and it will relieve the patient just as colotomy will relieve him; but nothing in surgery is more certain than that, if it is to be done at all, it must be done in time. To perform a gastrostomy at the eleventh hour, when the patient has been half starved, and worn out with pain, sleeplessness, and toxæmia, is simply to accelerate his death. It is often difficult, in the first few days, to accustom the stomach to catheter feeding alone, and therefore the operation should be done while yet the tube is working well: but increasing difficulty in reintroducing the tube, increase of thoracic pain, the occurrence of slight hæmorrhages, and progressive loss of weight should be the signs pointing to the need of operation.

With regard to treatment after gastrostomy, there are certain points to be remembered. In the first 24 hours attention should be directed to the control of vomiting, lest the stitches binding the stomach to the parietes should be broken down; and here I may say that, if the patient is operated upon at a rather late period, vomiting may seriously interfere with his nutrition, and therefore the operation had best be done under local anæthesia. Let the feeding be carried out very gently at first; one or two teaspoonfuls of peptonised milk per hour, Brand's jelly liquefied, meat juice, and perhaps some of the patent foods in small quantities may be tried first. Later on creamed chicken or fish may be given, and if meat is attempted, only the most digestible portions must be used, and these must be treated in the same manner in order to permit of their passing through the catheter and being easily assimilated. As pointed out by Jacobson, many of these patients feel sorely the loss of masticating their food, and the enjoyment of taste is denied them; in such a case, it may be possible for them to insalivate the softer foods themselves, and then pass them directly into the tube: in this way the loss of saliva is avoided, and some satisfaction is permitted to the patients. The difficulties that have to be contended with are not numerous, but they are rather troublesome. Of these gastritis is one of the most so, and at times it seems to persist in spite of any treatment. It is probably due to several causes; thus the loss of saliva, the presence of foul discharges from the growth, the irritation of the catheter in the stomach, and the restricted movements of the latter, owing to the adhesion to the abdominal wall, have all probably something to do with it. It must be treated on the usual lines of acute gastritis, but there is no doubt that it is very resistant at times, and is often the beginning of the end. The blockage of the tube is a common enough matter, but is usually overcome; but it may arise from the eye of the catheter, which has slipped out some distance, lying actually in the course of the fistula instead of in the cavity of the stomach: a mark should be made on the catheter at the operation showing its correct position in the wound if this accident is to be avoided. In the event of the catheter coming out of the fistula, difficulty may be experienced in returning it; it may even be impossible to do this if contraction has occurred. In such a case the only thing to be done is to mechanically distend the stomach, and make a fresh track in the site of the old one by means of a fine bistoury or a sharp trochar and canula. The operation is, however, not without danger. Extravasation of gastric juice may lead to erosion of the edges of the wound, and the occurrence of a painful eczema madidans. From the first this should be guarded against by the protection of the part immediately round the fistula by a dressing of lint moistened in some weak alkali. As regards the pain in these cases, I fear science has got no further than the administration of morphia in ever increasing doses, and with this I have no fault to find. Our business is to prolong life, but if we are compelled to do this in these terrible cases, it is at least our duty to see that it is done with as little suffering to the victim as possible.

DIFFICULTIES OF DIAGNOSIS.[1]

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In making a diagnosis, we are necessarily limited, by the existing state of general knowledge, to such arbitrary divisions or pigeon-holes as are currently accepted by the medical thought of the day. From time to time, these pigeon-holes have to be altered to suit the progress of knowledge; it may be that they have to be further subdivided, or it may be, on the other hand, that some two or three have to be joined together into one.

Thus, the increase in our knowledge of the leucocytes has subdivided the old group of anæmias; whilst, conversely, the discovery of the tubercle bacillus has joined together the two pigeon-holes of my student days, Scrofula and Tubercular disease, into one larger pigeon-hole, Tuberculosis.

On the whole, however, these divisions keep much the same. There may be a slight variation in name, according to the changing fashion of the day, but we are, in this matter, very conservative.

But whilst the pigeon-holes remain much the same as they were in our younger days, there comes to each of us a time, when we feel a sense of dissatisfaction with these arbitrary and, sometimes, apparently useless, subdivisions of the text-book. So many of the cases, seen in private practice, seem to be the exceptions which prove the rule, rather than the typical cases which used to be so common in our student days! Such a sense of dissatisfaction is not only natural but, I think, a healthy sign of personal progress.

It means that, with growing knowledge and experience, we are beginning to realise that the mere tying of a label on to a group of symptoms is not, in itself, the sole object and aim of our efforts, and that, in disease, there are no such arbitrary divisions as our pigeon-hole system would suggest. And yet there is a very real danger in allowing this contempt or text-book diagnosis to influence us too far. The descent to the "no-diagnosis" swamp is very easy—a sticky bog, full of "Will-o'-the-Wisps" and bubbles of noxious gas, peopled by charlatans and quacks!

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[1] A paper read before the Sheffield Medico-Chirurgical Society.

Moreover, there are other factors which strongly help us on to the downward path. There is the laziness, begotten of overwork and advancing years, and, still worse, the reiterated, demonstrable evidence that the public, who form our *clientèle*, are equally satisfied with such a "no diagnosis" as "Inflammation," as with a more exact, but less intelligible, true diagnosis.

Even if we find the arbitrary divisions of our pigeon-holes more irksome and less valuable in the philosophic doubt of later years than they were in the dogmatic days of youth, it is a fatal mistake to neglect them. They help us to make something definite out of much that is ill-defined, and form a fixed point from which we can look around. Yet, however successfully we may resist the insidious temptation to give up making diagnoses, there are many cases in which it is very difficult to know into which pigeon-hole to place them. These difficulties of arriving at a satisfactory diagnosis may arise in various ways, either from (1) insufficient knowledge, (2) insufficient experience, or (3) insufficient data.

(1) *Insufficient Knowledge.*—By this I do not mean gross ignorance, but either an insufficiency of general knowledge ot what advances are being made in medical things, or an insufficiency of special knowledge in some particular branch or branches of our profession. Thanks to an excellent cheap medical press, no one can excuse himself for not keeping up with the more important advances of medical work, and, as regards special knowledge, it is perfectly obvious that it is impossible for any man to be a specialist in all branches of his art, and that, with every further advance of knowledge, this difficulty becomes even greater.

(2) *Insufficient Experience.*—This is the difficulty of weighing up various symptoms and signs, of putting them in their proper relative positions of importance, and of making proper deductions from them. I need not lay any stress upon these. During the first few years of private practice, it has worried each of us, and will continue to worry all who come after us. Oliver Wendell Holmes has given us a classical instance in

his charming account of the youthful practitioner diagnosing Addison's disease. However, we all grow out of this sooner or later. I have heard an experienced physician defined as "one who has made every possible mistake that can be made, and consequently has no further to make." Unfortunately, this is but a half-truth, for, with experience, come the mistakes due to over-confidence, hasty diagnosis, or careless examination. There is also the doubt which comes of seeing too many exceptional cases. I remember once a case of a typical secondary syphilide being sent for a confirmatory opinion to a leading skin specialist. To my astonishment, he hesitated in his diagnosis, and declined to express a definite opinion. On mentioning this to one of his colleagues some time later, he said to me: "My dear Sir, Mr. . . . has seen so many extraordinary cases in his time that he can hardly admit the existence of a simple straightforward one."

(3) *Insufficient Data.*—This is much the most common cause of difficulty of diagnosis. It may be that the data are there, but that they have not been sought for, or it may be that they do not exist.

Of the former type, it is unnecessary to quote examples: they vary from gross negligence to an accidental oversight.

Of the latter type, in which data do not exist, the early stages of many specific fevers are common examples. In such cases it is impossible to make a diagnosis until the necessary data are forthcoming. Unfortunately, it not infrequently happens that an exact diagnosis is demanded when such is not possible. The method of dealing with this difficulty depends upon circumstances. If the enquirers are sensible people, and the doctor has their confidence, the true position is explained and patience asked for. If, on the other hand, these happy conditions do not exist, a sufficiently broad and comprehensive diagnosis must be made, such as the existing data alone warrant. There is a third way of which I will quote an example, but which I do not recommend. Some years ago, I was asked to see an elderly lady in consultation with a "locum tenens." I was unable to arrive at a definite diagnosis of her very vague abdominal symptoms, but was sure that there was nothing of any serious nature. I told the friends so. They were not fully satisfied. On his return home next day, the principal was told of my visit and of their dissatisfaction. He went straight off to the house with the locum tenens, and, placing his hand on the abdomen of the woman, said: "Why, you've got an abscess on your liver!" The friends were greatly relieved at hearing so speedy and sure a diagnosis, and I am pleased to say that the abscess completely disappeared in a few days without operative interference or sequelæ!

There are, then, many cases which, for a longer or shorter time, or even during their whole course, provide data either insufficient in quantity, or of such doubtful quality that a satisfactory diagnosis is impossible.

In such cases it is always possible and very desirable to make a "provisional diagnosis." I am convinced that the actual setting down of such a provisional (or alternative) diagnosis, in writing, opposite the name of every patient is a valuable thing to do—even if it eventually proves to be absolutely wrong. If we are compelled, for purely business reasons, to provide wide diagnostic pigeon-holes such as "lung trouble" or "cephalalgia," in order to satisfy unreasonable demands, there is all the greater necessity that we should not, ourselves, rest satisfied with this, but put down our definite provisional diagnosis, so that, even if it eventually proves incorrect, we may nail our mistake to the counter and so gain by it. This is particularly important for the practitioner who is seeing cases evolve and develop gradually day by day: the aspect of such cases changes by such fractions daily that it may in time completely alter itself without the watcher being aware of any material change. In such a case an attempt, say once or twice a week, to reconsider that provisional diagnosis will often produce surprising results.

Many difficulties of diagnosis which were met with formerly have been diminished, or even abolished, by the advance of scientific knowledge. This is particularly the case in such diseases as enteric fever, diphtheria, and tuberculosis. For this we have to thank the bacteriologist largely.

To what extent the use of tuberculin, either as an ophthalmic reaction or otherwise, will eventually prove of real value remains to be seen. It is probable that the diagnostic value of X-rays will become more generally recognised, as time goes on, in diseases of the heart, lungs, and alimentary canal, a use which is at present somewhat overshadowed by its power as a therapeutic agent. Recent valuable studies in the subject of constipation by means of radiography, after large doses of bismuth, have opened up considerable possibilities in this direction. I need hardly mention the many difficulties which the blood-count has lessened.

DOUBTFUL CASES OF INTRACRANIAL TUMOUR.

A not uncommon cause of difficulty in diagnosis is the presence of symptoms, such as severe and prolonged headache, vertigo, etc., which persist, in spite of various kinds of treatment, until the question of a possible intracranial tumour arises.

It is well to remember how rare an occurrence intracranial tumour is, and how numerous are the possible causes of headache, vertigo, and vomiting, and to avoid making a diagnosis of the first named until there is some positive ground to go on. The following points occur to me in connection with this subject :—

An intracranial tumour of large size and rapid growth need not necessarily produce any headache during the whole of its course. In a case which I recorded in the *Clinical Journal*, March 11, 1908, there was neither headache nor vomiting from first to last, although the tumour was of the size of a Tangerine orange and of rapid growth. Optic neuritis may not occur until late in the disease. In a case of cerebellar tumour in hospital, some years ago, although a correct diagnosis had been made several weeks previously from the other symptoms, headache, vomiting, nystagmus, vertigo, ataxia, and forced movements, yet the swelling of the discs did not begin until two or three weeks before death.

Again, there are cases which show sufficient cardinal signs and symptoms to be definitely diagnosed as intracranial growth, which completely clear up on treatment with iodide of potassium.

One may suppose that all such cases are of a syphilitic character, although the evidence in favour of such an origin is sometimes conspicuous by its absence. Many years ago, I saw such a case with intense headache, vomiting, double optic swelling very marked, with occasional internal strabismus of the right eye, in a married woman of thirty. All her symptoms completely disappeared under iodide of potassium. She had had no miscarriages, was certainly not a congenital syphilitic, and had no stigmata of syphilis.

Tubercular deposits in the central nervous system may also shrink up and cease to produce active symptoms, as was shown in a case under me in the Royal Hospital some years ago. The paralytic symptoms of the previous year had practically disappeared when a tubercular meningitis ended the scene, and, at the autopsy, a circumscribed calcareous focus was found in the pons.

It is naturally the tumours of the "silent" portions of the brain which give the greatest diagnostic trouble. I remember a case, some years ago, under my senior colleague at the Royal Hospital, of an extensive tumour of the frontal lobe in which the symptoms were chiefly conspicuous by their absence; and, at the present time, I am seeing a typical case of difficult diagnosis in which something of this sort is feared.[1] More commonly, the intracranial tumour gives some definite evidence of its presence and often, before very long, of its general situation.

HYSTERIA: FOLLOWING LOCAL INJURY OR DISEASE.

Hysteria, in its various manifestations, not infrequently causes difficulty in diagnosis, on account of its mimicry of organic disease. This mimicry is often referred to as being exceedingly close and accurate. With that view I am not in agreement. The mimicry is, to my mind, usually only superficial; it errs, as a rule, by its excess; it is overdone. Cases of course vary considerably: in some the hysterical stigmata are prominent and not possibly overlooked, in others they are more troublesome to find.

One is apt to be misled in the diagnosis of hysteria on account of its frequently following a local minor injury or disease. I believe that such a localising factor in determining the type of hysterical outbreak, at any given time, is by no means uncommonly found if sought for.

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[1] This case, after several weeks of intense headache, followed by stupor, with marked nystagmus and doubtful slight changes in the discs, recovered completely, and the patient is now at work perfectly well. (A. J. H.)

In such cases, one has known that the original morbid condition was organic, and consequently the insidious development of functional symptoms is difficult to recognise. I could quote many examples of this difficulty. Thus a localised hysterical aphonia or dyspnœa may following an ordinary laryngeal catarrh. I remember the case of a hospital nurse, who had suffered from laryngeal catarrh for three weeks, and who was seized with severe dyspnœa which was causing considerable alarm. When I saw her, she was lying in bed with a tent over her, and a steam-kettle containing eucalyptus alongside; around her were friends anxiously watching. She tossed about, with loud, harsh breathing, the lips and alæ nasi working violently. In spite of all its violence, there was no true dyspnœa, the stridor was entirely expiratory in time, and the entrance of air into the thorax perfectly free and good. In this case, the laryngeal catarrh had localised the disturbance, and the frequent sight of cases of dyspnœa had probably further developed it.

Similarly, I remember a case of a slight knock on the left hand in a woman, æt. 25, which was followed by extreme hyperæsthesia, with excessive pain over extending parts of the hand, forearm, and shoulder. It was purely hysterical. In this woman there was a history of—

(1) Frequent fits at Sunday school when a child;
(2) Loss of use in legs (one year ago).

In another case, a slight wound of the hand was followed by paralysis lasting for months.

Another case, which illustrates this point in a twofold manner, and which, in addition, introduces that peculiar type of hysterical manifestation, namely, anorexia nervosa, deserves notice. The patient was a little girl aged 10 years. According to the history, she had been stung or bitten by a fish in the right hand a year before, whilst bathing, and since then she has been unable to use the right thumb and index finger, which are said to be paralysed. One month before my visit she, together with all the others, had suffered from an attack of diarrhœa with mucus and blood. This subsided, but was followed by daily recurrent pain in the abdomen, rapid emaciation, marked emotional symptoms, and distaste for food. She is now extremely wasted, the abdomen quite hollow, and there is much constipation. She was thought to have some abdominal tuberculosis. The history of the onset, and the very rapid emaciation in so young a child, made me hesitate in confidently diagnosing hysteria, but such a diagnosis was very strongly supported by the curious psychical symptoms. Thus she had declined to see her father for two weeks, she would burst into tears for no apparent cause, and she had violent recurring abdominal pain at a certain hour daily, viz., 3.20 p.m., although she could not see the clock. I was quite satisfied that there was really no paralysis of the thumb and finger, nor did I think that there had ever been.

The after-history proved the diagnosis to be correct, although it was impossible to get the parents to support the diagnosis by moral treatment.

HYSTERIA UNDER UNUSUAL CIRCUMSTANCES.

Whilst referring to this case, I would remind you that although hysteria in this country is usually observed in females, at or about the time of puberty, yet it is not limited to them. The case I have just related was only ten years old. A few years ago I published a series of cases in men and boys.

The following case is that of an old woman, of 60, and illustrates the difficulties which these cases may present when they follow injuries, and occur at unusual times of life. I was asked to see an old married woman, of 60, who for 27 years had been subject to fits which were said to be "epileptic."

About 3 months before I saw her, whilst riding her tricycle, she was knocked down by a motor car. She was taken to hospital, where it was found that she had three ribs broken on the right side. There was hæmoptysis. Shortly after admission, she was said to have had a "right hemiplegia with aphasia." She recovered sufficiently to go home about six weeks after. I was asked to see her on account of frequently recurring "fits," which were causing considerable alarm to those around her. My impression, before seeing the woman, was that she probably was in a condition of "status epilepticus," and I wondered at so marked an epileptic being allowed to ride a tricycle. On seeing her, however, all my preconceived views had to be completely abandoned. The notes I made at the time are as follows:—

"An old woman, of a strikingly neurotic and selfish appearance, 'perfectly sharp and wide-awake as to all that is going on in the house, a regular shrew.

"She is sitting propped up in bed with the right eye partially closed, and her right arm held stiffly and swathed in dressings. When spoken to she replies in an extraordinary, high pitched, drawling monotone. There is no difficulty in selecting words or in pronouncing them, though, at times, she does not do so. Twice she burst into tears. The right side of the face moves less than the left. The right pupil is slightly the larger. The tongue is protruded a little to the right. The right arm cannot be moved. The fore-arm is swollen and tender up to the middle of the arm. The right hand is perfectly straight, the fingers not being flexed. There is no anæsthesia. The legs are quite normal on both sides. The sphincters are controlled. The knee-jerks are brisk on both sides, there is no extensor toe jerk. The palatine reflex is much diminished."

I was satisfied that the paralysis of the right arm, when I saw the case, suggested a functional affection rather than organic disease, and with that began to enquire further into the history of the case.

In the first place, as to the supposed "epileptic" fits, which had lasted for "27 years," a careful enquiry showed that—(1) She never falls in them. (2) She has never hurt herself. (3) She never bites her tongue. (4) She kicks and throws her arms about, and has to be held by her husband on account of her violence.

It was further volunteered that she is very emotional, and is easily made to cry. In this case, it is of course quite possible that the "hemiplegia with aphasia," which occurred the day after her accident, was organic, and due to some injury received at the time. As I did not see her at the time, it would be presumptuous on my part to deny this, but, when I did see her a few weeks later, the paralysis of the right arm was purely functional and not organic, and, from the history of the course of the case, I feel that there is considerable probability that it had been so from the first.

As regards the supposed "aphasia," it seems that, for a day or two after the accident, she did not speak, and that, when she began again, it was in the peculiar manner which I have described above. Such a history does not warrant the use of the term aphasia at all. The supposed paralysis of the right face was, I believe, merely the frequently observed inequality of action of the two sides in neurotic persons.[1]

The inequality of the pupils was probably nothing new, when looked for it is often found, and, as a matter of fact, is not a sign of hemiplegia. The arm showed none of the usual appearances of over-action of the flexors with closure of the hand met with in old hemiplegias, and there was no increase of muscle jerks in it.

The further history is also instructive; her medical attendant tells me she is now quite well, the right arm is a little stiff, but she is able to use it freely. Her speech is normal, and she has had no fits for several months, in fact, she is better now than she has been for years.

PHANTOM TUMOURS.

Of hysterical abdominal cases the occasional occurrence of a so-called "phantom tumour" is sometimes very puzzling. In such few cases as I have seen, the tumour has always been associated with an arching upwards of the lower dorsal spine, and has practically disappeared when the patient is made to lie flat on the bed. If there is any difficulty, a few whiffs of ether will directly settle the point. I had a very marked case of this in the hospital, 16 years ago, in a girl of 15 subject to "convulsion fits." The tumour was limited to the left hypochondrial region, its outline extremely distinct, and it was associated with vomiting. Under ether the change, when she took her first full inspiration, was remarkable, the abdomen becoming quite hollow. History records more than one such case getting as far as the operating theatre.

HYSTERICAL PARALYSIS.

Hysterical paralyses of all sorts are a fertile source of difficulty in diagnosis, whether monoplegias, hemiplegias, or paraplegias.

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[1] The partial closure of the right eye was probably due to a spasm of the orbicularis. Since the above was written a very similar case of hysterical hemiplegia has been published by Schultze (*Deutsch. med. Woch.*, No. 13, 1908), in a man of 65 years of age, following an accident, in which a similar spasmodic closure of one eye was seen. (A. J. H.)

I cannot spend any time in quoting cases or describing symptoms. The difficulties of diagnosis are often great, even in hospital, but they are infinitely greater, when the patient is surrounded by sympathetic friends and relatives, and has to be tackled on her own ground.

The following points seem to me to be worth remembering:—

Difficulties most commonly arise from lack of systematic examination. If the evidences of nervous disease are gone through in some definite order, such as motor symptoms, sensory symptoms, trophic symptoms, reflexes, etc., there is much less chance of error than if one begins (and sometimes ends) with the knee-jerk. The question of muscular power should be carefully gone into. In a supposed hysterical paraplegia, the patient should always be helped out of bed, and her walking power tested: this will often show an amount of muscular force used to prevent herself performing purposive movements which is alone almost diagnostic. Violent tremors of the limbs, or of the whole frame, on making such attempts are strongly suspicious of hysteria. As regards the various superficial and deep reflexes. In a case in which the knee-jerks are not obtained when the patient is lying in bed, do not assume that they are absent; have the legs hanging over the edge of the bed, and be quite sure there is no spasmodic fixation of the knee when the examination is being made. Mere increase in the briskness of the knee-jerks is not evidence of organic disease. Increased knee-jerks, with loss of plantar reflexes, suggests hysteria. True ankle clonus is obtained when the ankle is fully flexed and the tendo-achillis stretched. A spurious ankle clonus may be often found on beginning to press the foot upwards whilst the gastrocnemii are contracted, such a clonus tends to disappear after a few contractions, or if the ankle is further flexed; it has no pathological significance. Similarly, in hysterics, striking the patellar tendon may be followed by a kind of spurious clonic spasm of the extensors, which is characterised by its irregularity of rhythm, and its tendency to affect the whole limb or both limbs. Loss of the palatine reflex is a common and valuable sign in hysteria.

HYSTERICAL SKIN AFFECTIONS. DERMATITIS ARTEFACTA.

Hysterical skin affections form as puzzling a class of cases for diagnosis as any. When they present some strikingly gross exaggeration the diagnosis "jumps to the eye," but most frequently they do not. On careful observation, however, they nearly always reveal what I have referred to before, viz., *their excess.* General broad rules for their diagnosis are:—

(1) They do not fit in with any ordinary skin disease. (2) The outline of an individual patch frequently shows some angular contour, such as is never seen in spontaneous disease. (3) They are almost always in some actually or easily exposed part, visible either to the passers-by, or to the domestic circle. (4) They are always in a position which can be got at easily by the hand, usually the right hand. (5) They are characterised by their rapid power of completely healing when protected, and their extremely sudden reappearance either on the same or other sites.

One of the most striking instances of such a hysterical dermatitis artefacta was recently shown to me by one of my colleagues at the hospital. She was a middle-aged single woman with an ulcerated surface on the chin, admitted to hospital for skin grafting. This was successfully performed, and did well, until one morning when, without warning, the whole of the place had apparently sloughed over, and there was once again a completely ulcerated surface. Later, a sudden complete excoriation of the whole upper lip occurred, and, when I saw her, the appearance was most remarkable. There was a semi-lunar raw surface, occupying the whole of the upper lip, ending in two sharp points at the angles of the mouth, a typical moustache area. It had a sharp edge and was covered with the most perfect healthy granulations I have ever seen. It was obviously longing to heal, if she would only allow it to do so.

Having given general laws for the diagnosis of hysterical skin eruptions, I must quote a case of dermatitis artefacta, which was hardly hysterical, and of which the localisation did not agree with my rules just laid down.

Some years ago I was asked to see a young married man with a peculiar eruption on the sole of the left foot. It had troubled him for three months, completely preventing him from working. It conformed to the rules, which I have laid down, in its lack of resemblance to any type of skin disease, in its curiously sharply marked tripartite appearance, and also in the rapidity with which it healed under almost every type of application, only to recur the next day, in the same or a neighbouring part, with the greatest persistence. But the sole of the left foot can hardly be described as a visible or easily accessible part, moreover, it prevented him from working, and he was the father of a family. The alternatives for diagnosis in this case were:—(1) Some local pyodermic infection. (2) A trophic lesion (?) (3) An "artefact." I think the point, which clinched the diagnosis of the last-named, was the complacency with which this responsible young paterfamilias met the constant failures of all treatment to effect a cure, in fact he was described by his medical man as being "wonderfully patient." Further enquiry elicited the information that he often came back from his day's work quite "faint," and that the business, from which he receives the same salary whether working or not, is his father's. Thus, in this case, the exposed, or easily accessible site of the pure hysteric, desiring the sympathy of the world in general, or his private circle in particular, was exchanged for a more practically useful site, viz., the sole of one foot, where, alone, a limited area of eruption could entirely prevent any return to work "ad infinitum."

The treatment adopted was a back splint with dry antiseptic dressings and a plentiful supply of wool and bandages. The dressings were only to be removed by the doctor "so as to preserve complete asepsis!" As our surgical colleagues say, "the patient made an uninterrupted recovery."

Everything disappeared in three days, and on the following day he went to work. There has never been any recurrence.

PLUMBISM.

During recent years, I have come across many difficulties in diagnosis of cases in which, thanks to a very definite "sign" of the disease, no such difficulty should have been experienced. I refer to Burton's blue line on the gums in lead poisoning. The reason for this appears to be the fact that, in many centres of medical education, such cases rarely or never occur, and consequently the sign has only been read of in text-books during student days, never seen. Once properly seen, it can never be mistaken. There is probably no other disease which is so easily and surely diagnosed, in spite of its manifold symptoms, and yet it is overlooked time after time. In many cases, it is readily seen, but it may, on the other hand, be so extremely limited and localised as to require very careful looking for, and even the use of a lens to make quite sure of it. The quantity varies inversely with the freedom of the teeth and gums from tartar and food remnants. The following case out of many illustrates this point. A woman, aged 30, had been seized two weeks before with severe pain in the back, which shot into the bladder. There was no pyrexia. The pain was continuous, at times it doubled her up, and she screamed out with it. There was no vomiting, the bowels were costive and she was losing flesh. Large quantities of sulphonal had been given to induce sleep. When I saw her she was in a maudlin, silly condition, tossing about on the bed, and shouting out with pain in the back. The abdomen was flaccid, there was tenderness almost everywhere. I was asked to see her for a diagnosis, and I could find nothing to account for her condition. The symptoms suggested all sorts of things but fitted none.

Fortunately I thought of her gums, and, after a careful search, found the merest trace of blue granular deposit beside one of her lower incisor teeth. It required a lamp and a lens to make quite sure, but it was there, and with it the symptoms became clear. She had been taking diachylon pills. Although her husband and friends strenuously denied any knowledge of her having taken anything, we elicited the important information that her periods had been irregular since Christmas, that this had bothered her a good deal, and that she would not see a doctor till two weeks ago, although her husband urged her to do so.

ABDOMINAL CASES.

It would take too long to consider the manifold difficulties of diagnosis which are presented by diseases of the abdominal viscera. I can merely refer to a few points.

Carcinoma of the œsophagus is usually very easy to diagnose, and attracts attention by one symptom, viz., dysphagia. Take away that symptom entirely, and it may be very difficult to diagnose. I have recently seen a striking instance of this. The case is much too full of detail to relate here, but the chief features were enlargement of the liver and spleen, with pain in the left side and back; later, empyema with continued pyrexia, marked increase in the splenic enlargement and eventually death. None of these suggested œsophageal carcinoma. At the autopsy, an extensive ulcerating new growth of the œsophagus was found.

It is interesting to note that, in this case, the woman put on flesh steadily, from 8 stones 11½ lbs. to 9 stones, whilst in hospital, in October 1907, *i.e.*, just two months before death. That such a thing is possible during the progress of a carcinoma is certain. I remember a case of carcinoma of the colon, in which 3 lbs. were put on, and this increase of weight was allowed to influence the diagnosis disastrously.

FUNCTIONAL OR ORGANIC DISEASE OF THE STOMACH.

A problem, which is repeatedly placed before us, is to decide whether certain symptoms of dyspepsia indicate that there is malignant disease of the gastro-intestinal tract or no.

Now, an *early* diagnosis of gastric or intestinal new growth, using the term early in the sense we should apply to a growth in a visible or readily palpable position is, in the present state of our knowledge, impossible. Nor can one see as yet by what line of examination such an early diagnosis is likely to become possible. By the time the growth has become large enough to form a palpable swelling, or to surround the digestive tube, and produce symptoms of obstruction, and so make its presence definitely appreciable, it has been in existence much longer than is desirable.

Unfortunately, it may, owing either to its deep-seated position or to its mode of extension, persist for a still longer period without giving either of these data for diagnosis. In such cases it often happens that some secondary enlarged gland in the neck, or the appearance of symptoms due to secondary infection of other organs, gives the key to diagnosis and the contra-indication to operation at the same time.

It may be suggested that, in doubtful cases, an exploratory laparotomy should be advised, that such an operation is, nowadays, practically of little danger, and that, by means of it, the question can be definitely settled.

This is only one side of the case. It is obvious that a laparotomy should not be advised until every method of diagnosis has been fully and carefully gone through. That if a laparotomy were to be performed on every case of doubtful malignant disease of the digestive tube, a great many totally unnecessary operations would be performed every month. Besides this, it must be borne in mind that, whilst an exploratory laparatomy in a perfectly healthy adult may be free from danger to life, as compared with the mortality from such an operation in all other circumstances; as compared with the medical treatment of non-malignant dyspepsias, which this particular case may quite possibly be, it has a high mortality.

Nor is it always certain that, when the abdomen is opened the actual nature of the disease will be made clear. I cannot help quoting two cases to illustrate this point, which have recently come under my notice. In one of them, a middle-aged woman suffered from enormous dilatation of the stomach, due to pyloric stenosis. Gastro-enterostomy was performed, and, during the operation, the surgeon felt a large lump at the pyloric end of the stomach, with some enlarged neighbouring glands. He determined, for very good reasons, to complete the gastro-enterostomy, and deal with the pyloric tumour at a second operation. The woman did extremely well, and, in the course of a short time, the second operation was undertaken. On putting his hand into the abdomen, the surgeon was unable to feel any abnormality at all about the pylorus or any enlarged glands. In other words, the lump had been inflammatory, not malignant.

I should like to add that the eventual result was highly satisfactory in every way. I have merely mentioned this case in order to emphasise my point, that a laparotomy does not always completely clear up everything.

Another case of a somewhat similar kind was recently under my care in the hospital, and was particularly instructive, to say nothing of its medico-legal aspect.

A youth, about 18 years of age, was sent into hospital with a history of an accident in the pit some months before, followed after a time by a swelling in the epigastrium with persistent vomiting and emaciation. On admission he had a large nodular swelling in the left hypochondriac and epigastric regions—hard, and deep, and fixed. Vomiting was frequent and emaciation considerable. There was no pyrexia. A malignant tumour was diagnosed, and, after a consultation with my surgical colleague, it was decided that the growth was much too advanced to hold out any prospects of successful removal. It grew rapidly in size during the next few weeks and the emaciation became extreme. Death seemed to come on gradually, and, for some hours, even days, before the end, there was stagnation of the cutaneous circulation with the mottled appearance usually only seen after death. At the autopsy, a very large mass of "new growth" was found involving the transverse colon with chains of enlarged glands extending from it. It was exactly what had been expected, and no doubt was expressed by those present at the autopsy, as to its malignant nature. When, however, in the usual course of events, portions were examined microscopically at the University, it was found that this mass and the enlarged glands were not malignant at all, but inflammatory, and the presence of streptococci in large numbers was demonstrated.

If, then, it is possible, even with the more extensive opportunities for examination, which a laparotomy performed post-mortem permits of, to be completely deceived as to the true nature of a swelling, how much more may it be so with the limited opportunities of an exploratory incision?

How, then, can we best endeavour to settle these difficult questions? I am convinced that we might all do more by extending our diagnostic methods in these cases. We ought to make more general use of the various methods of clinical examination, which are at our disposal for examining the stomach contents by means of test meals and lavage, for estimating the motive powers of the stomach, and for examining the fæces for occult blood, or in other ways. None of these involve much expense, or any very great labour. There is a certain amount of personal trouble for both the doctor and the patient, but, considering the importance of this type of case, it is really nothing. Especially is this the case with the stomach examination, where valuable information can be obtained with surprising ease. Moreover, in all the larger centres, there are laboratories, in which such examinations can be made at a small fee for those who do not care to undertake them for themselves. I am sure that the systematic adoption of such aids to diagnosis, in difficult abdominal cases, will help to reduce many of the difficulties which so often present themselves. These cases are usually difficult because the data are insufficient.

In conclusion we may ask ourselves, "How do difficulties of diagnosis usually arise? Is it from lack of knowledge, experience, or data?" The answer must be that it is most often from lack of data. In a certain percentage of cases, the data do not exist, but in most cases they do exist, but have not been obtained.

CANCER OF THE BREAST; INDICATIONS FOR OPERATION.

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THE treatment of cancer of the breast frequently involves problems of the greatest difficulty. In many cases, it is at once certain that operation is the only practical course; in others, it is equally certain that any operation would be futile, or even harmful. But there is a large number of borderland or doubtful cases in which it is exceedingly difficult to say whether operation should or should not be performed.

It is evident that we want to do the very best for each patient, that we want to give each one every possible chance of cure or relief; on the other hand, we recognise that the repeated performance of extensive operations ending in failure will do nothing but harm to this branch of surgery, and will encourage other patients to take a hopeless view of their disease, and to postpone or avoid operation. The history of operations for mammary cancer is one of consistent progress, and there is no reason why this should not continue to be the case. Cases, which were formerly beyond the reach of surgery, can now be dealt with, with definite prospects of success. Our knowledge of the pathology of the disease has also made great advances, and so it happens that the indications for treatment are in many ways altered.

The contra-indications to operation are enumerated in all the text-books, and indeed tend to become traditional, but it is necessary that, with the advances of modern surgery, we should examine these contra-indications from time to time with the hope that we may be able to modify or eliminate some of them. I propose to deal briefly with some of the conditions, which may cause special difficulty in regard to the question of operation. The term *radical* will be used in reference to the modern operation, in which a very thorough removal is made of the breast and its lymphatic area, and which includes both pectoral muscles and a wide area of the deep fascia with the lymphatic-bearing tissues from the epigastrium to the apex of the axilla.

The question of treatment of *cases, in which the supra-clavicular glands are involved,* is one of great difficulty, but is essentially one in which no hard-and-fast rules can be laid down. The involvement of these glands is usually considered a contra-indication to any attempt at a radical operation, and the following are the chief reasons advanced for this opinion; that when the growth has spread to above the clavicle, there is almost always growth in the mediastinum, or in other inaccessible parts, which will render operation futile; that these operations involve great shock and risk, and that early recurrence is the rule.

Clinical experience, however, has shown conclusively that this complication does not make the prognosis absolutely hopeless, and that, in some cases, there is sufficient prospect of success to warrant operation. In the first place the enlarged glands in these cases are not always cancerous; it sometimes happens that these glands, whether in the axilla or in the neck, show a large-celled hyperplasia without any evidence of cancer infection, and such glands may entirely disappear after removal of the growth. In most cases, however, the enlargement is due to cancerous involvement; operations have been practised for these advanced cases by Prof. Halstead,[1] and by surgeons who have followed his teaching; the results fully justify the operation in properly selected cases, and prove that the increased risk is extremely small. Mr. C. B. Lockwood,[2] in a paper in the *British Medical Journal,* also refers to encouraging cases; in one instance a patient, aged 49, was well three years after an operation for mammary cancer with removal of diseased cervical glands.

The essential difficulty in these cases is the early detection of the enlarged glands; the deep fascia at the root of the neck is so dense that slightly enlarged glands are often impalpable, especially in stout subjects; the important glands also, those at the angle between the subclavian and internal jugular veins, are deeply placed.

For practical purposes we may divide these cases into two groups. In the first group, the glands are moderately enlarged and not fixed; there is then no special difficulty about operation, if the anatomy of the parts is remembered; in fact, the proceeding often proves much simpler than palpation had led one to expect. A large flap is turned up over the lower part of the neck, and the angle between the subclavian and internal jugular vein is exposed: the most important glands lie here, those fed by the highest axillary glands and communicating directly with the mediastinal glands; these glands also drain the occasional lymphatics which run directly upwards from the breast over the inner end of the clavicle. The dissection is started from this point, and is carried outwards and upwards; if this is thoroughly done, it may be possible to completely eradicate the disease.

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[1] *Annals of Surgery,* July, 1907.

[2] *British Medical Journal,* January 27, 1906.

In the second group of cases, the glandular involvement takes the form of a fixed mass behind the clavicle, dipping downwards behind the sternomastoid muscle: in these cases operation is useless; removal of the mass is exceedingly difficult, if possible at all, and there is always further disease out of reach.

The most suitable patients are those who are thin and comparatively old; in thin subjects, the enlarged glands are recognised at an early stage, and growth tends to be slow; in stout subjects, the disease in these glands is usually advanced before it becomes apparent.

To sum up, enlargement of the supraclavicular glands is not an absolute contra-indication to radical operation; these cases are not *all* hopeless; in some of them, the complete operation may be performed with a chance of success, which is definite, though small.

Atrophic scirrhus is a condition about the treatment of which opinions vary greatly. Many surgeons recommend that these cases should not be operated upon, because the disease may exist for many years without causing the patient serious trouble, and because some patients die of other causes before the mammary growth has affected their general health; it is also said that the operation may be followed by a sudden awakening of the disease.

It is true that patients with atrophic scirrhus may live for many years, but it is also true that the majority of these patients ultimately die from internal deposits; many of them suffer a great deal of local pain and discomfort, and the knowledge that they have a tumour of the breast is a continual source of mental distress. Moreover, these tumours, which are apparently atrophic, may suddenly take on rapid growth, and they then usually soon become irremovable.

On the other hand, thorough operation affords these patients a particularly good chance of permanent cure, and it at once relieves the local symptoms and mental distress. Of course, incomplete and imperfect operations may be followed by early recurrence. There may be some obvious contra-indication to operation, such as great age of the patient, or visceral disease; but most of these patients would not be considered too old for operation, if the disease were of the ordinary type.

One would therefore advise that cases of atrophic scirrhus should be submitted to early and thorough operation, unless the patients are very old or very feeble, or unless there is some other obvious contra-indication.

Pregnancy is a very serious complication in a case of mammary cancer, but it should never be made a reason for the postponement of operation. In considering the question of treatment, two main facts present themselves: (1) the fearful rapidity with which mammary cancer grows and spreads during pregnancy and lactation, and (2) the risk of miscarriage after the necessarily extensive operation. The indications are perfectly clear; the case should be treated exactly as if the pregnancy did not exist. Delay means rapid increase in the growth and probably early death; moreover, there is still a liability to miscarriage or non-survival of the child. On the other hand, the risks of miscarriage after operation are not great; I have three times operated upon these cases without disturbance of pregnancy. If the patient is in the last month of pregnancy, labour should be induced as soon as possible, and the growth should then be removed a short time after.

The treatment of cases of *bilateral carcinoma* may at first sight suggest difficulties, but may easily be decided in the following way. Each breast should be considered by itself, and a decision should be made as to whether operation would be advised for the disease in that particular breast, if the other breast were not affected. If one can answer in the affirmative as regards each breast individually, then operation for both sides should be recommended.

If operation is decided upon, the question arises as to whether both sides should be operated upon at the same time. In ordinary circumstances, the best plan undoubtedly is to first operate upon the more seriously affected breast, and then to allow an interval of a fortnight or so to elapse before removing the other breast; in this way, a more thorough and careful removal of the disease is possible than if both sides were dealt with at once. Several factors, however, must be considered; there are some patients who cannot face the prospect of two extensive operations, and there are those disappointing cases, which all surgeons encounter, in which the patient consents to two operations, but, after the first, refuses to allow the second to be performed. On the other hand, there are practical or placid women who have the moral courage as well as the physical powers to face two separate operations.

If the breasts are removed at the same time, all the resources of surgical organisation are called for; the work must be done as quickly as possible, though thoroughly, and above all things hæmorrhage must be kept at a minimum; the best plan is to have a skilled assistant, who can ligature vessels and sew up the wound, after removal of the first breast, whilst the surgeon proceeds to the removal of the other breast.

The age of the patient is a factor of importance. In *very young* subjects the prognosis is exceedingly grave; as a rule, growth spreads exceedingly rapidly, and visceral deposits are often already present when the case first comes under observation; for this reason a very searching examination must be made before the complete operation is decided upon. The youth of the patient and the malignancy of the growth demand a determined attempt at removal; if the axillary glands are implicated, those in the neck should also be thoroughly removed. If the growth is dealt with in its early stage, the prognosis is fair. In July 1905, I performed the radical operation for carcinoma of the breast in a girl, aged 20, and in June of last year, I operated similarly upon a patient, aged 24; both of these patients have remained well so far.

In *very old* patients, say, those over 70, the question of operation needs very careful consideration. In the first place, a great many of these patients will at once refuse to entertain any idea of operation on the ground that they are too old, and would not be able to stand it. In these circumstances one can only point out that no decision should be made until the facts of the case have been explained to, and carefully thought over by, the patient and her friends for two or three days.

The first point is to estimate the patient's practical age, for many of them will be found to be for surgical purposes much younger or older than the actual age given. For this purpose a thorough general examination must be made, special attention being paid to the heart, lungs, arteries, and urine. Secondly, a rough estimate should be made of the rate at which the tumour is growing, and the length of time which is likely to elapse before it causes the patient's death if no operation is performed. Accuracy in a matter of this kind is obviously impossible, but with care and experience an approximate result may be obtained; generally speaking, of course, these growths are very slow in old subjects; in fact, in some it is obvious that the patients are more likely to die from other causes before the growth is sufficiently advanced to cause them much trouble or to kill them. Thirdly, we have to take into account the probable risk of the operation, and this will depend on the patient's general condition, and the difficulty and duration of the operation; in the greater number of cases, it is advisable to limit the duration of the operation to half an hour.

Diabetes, Renal Disease, and Alcoholism are formidable complications, and the advice of a physician should be taken at once as regards the medical aspects of the case. Diabetes was formerly held as a contra-indication to operation owing to the risks of sepsis; in the present day, its influence in this direction is of comparatively little account; the chief risk is that of coma after the operation. A careful quantitative examination should be made of the sugar in the urine, and the amount should be reduced, so far as possible, by rigorous dieting and medical treatment. The existence of diabetes may readily be overlooked, unless a routine examination of the urine is made. I know of one case, in which fatal diabetic coma followed removal of the breast, the condition having been unsuspected until the development of coma. Renal disease does not negative operation unless it is advanced. Its presence, of course, calls for extra care and precautions in the management of the case. Alcoholism and cirrhosis may contra-indicate operation; in any case, the operation should not be extensive, and should be rapidly performed.

The increased risk, involved by the presence of these complications, must be explained to the patient, or to her relatives, but considering that, without operation, we are leaving her to die and to die probably sooner owing to the complication, operation will usually be desired in spite of the increased risk.

There are certain conditions which must exclude any attempt at radical operation:—(1) Fixation of the growth to the thorax; (2) extensive involvement of the skin, either in the form of brawny infiltration, or of multiple widely scattered nodules; (3) implication of the axillary vessels or nerves; (4) deposits in the viscera or in the bones. When the implication of the skin over the breast precludes any immediate operation, a trial should be given to X-ray treatment. This sometimes brings about sufficient improvement to allow of the full operation being performed later.

Palliative Operations.—Unfortunately many cases of mammary carcinoma, when first seen, are obviously too far advanced for any possibility of radical cure; but in some of these operation may give much relief.

These palliative operations are performed to prolong life, to prevent fungation, to give relief to pain, and so to make the patients more comfortable and happy during the time that remains to them. Removal of the breast, as a palliative proceeding, is most often called for in cases of comparatively young subjects with rapidly growing tumours; such tumours often cause much pain, and are a source of great distress to the patient; when fungation occurs, this distress is much increased, and the sepsis, which almost always invariably follows, rapidly shortens the patient's life.

The extent of the operation must depend upon the circumstances of the case; as a rule, it should approach the complete operation so far as possible, especially in the clearance of the axilla; in some cases, however, simple removal of the breast, and the most enlarged glands in the axilla will be preferable.

I would strongly insist upon one point, and that is this: in all palliative operations, the skin flaps should be so cut that they can be united without difficulty, the wound healing by first intention. Unless this can be done, I should advise against operation, for I believe that more harm than good is done by leaving a large raw surface; the very object of the operation is defeated by inability to completely close the wound; the long convalescence means much distress and disappointment to the patient, and growth often shows itself in the granulating wound, which then of course never closes.

In conclusion, I would urge that in all cases of doubt, the patients should be given the chance afforded by operation, for mammary cancer is a disease which follows no definite rules, and it often happens that, when we think there may be extensive disease in the mediastinum, or in other parts out of sight, there is none, just as it sometimes happens that, when we believe the disease to be well localised, it proves widespread.

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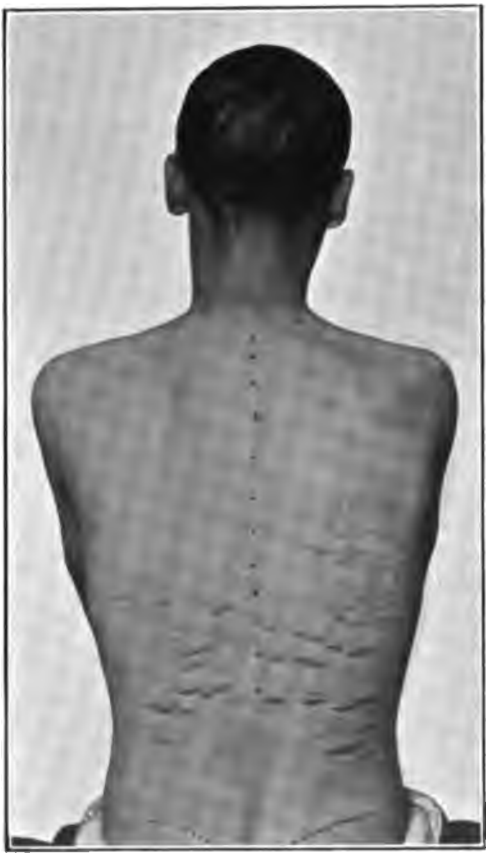
PLATE II.



The dots indicate the position of the dorsal spines and of the iliac crests.

STRIÆ ATROPHICÆ AS A SEQUEL OF ACUTE PNEUMONIA.

By F. CRAVEN MOORE, M.D., M.Sc., M.R.C.P.,
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[With Plate II.]

THE occurrence of atrophic striæ, as an occasional sequel of various acute infective diseases, is of interest as, in the absence of any obvious mechanical cause, it has led to the consideration of other factors—neurotrophic, cachectic—to which they might be ascribed.

In April 1907, a youth, aged 19 years, was admitted to the Ancoats Hospital under my care suffering from double pleuropneumonia, the illness had commenced three days previously with a rigor and pain in the right side. The whole of the lower lobe of the right lung was involved, and the lower portion only of the lower lobe of the left lung. The disease was of a severe type, and it ran a typical course, terminating by crisis on the tenth day after the onset, leaving the patient greatly prostrated. The sputum contained abundant pneumococci as the predominant organism. On the fifth day of convalescence, the patient's back was found to present a most remarkable appearance: the skin, otherwise normal in appearance, presented on both sides of the spine a series of bright red stripes across the dorso-lumbar region. On the right side, the striæ were more numerous and of larger size: they extended from the level of the sixth dorsal spine above to that of the third lumbar spine below; on the left side above, they appeared at the level of the eighth dorsal spine, and extended down as on the right side. The individual striæ were depressed below the level of surrounding skin, the larger more so than the smaller; they were smooth and shining, and in colour varied from pink in the smaller, to bright red or crimson in the larger, and the latter showed through the thinned epidermic layer the underlying vessels and capillaries. On testing the sensation, it was found that the striæ were somewhat less sensitive than the other parts of the skin, the patient failing to recognise the head from the point of a pin.

Cutaneous sensation elsewhere was normal, the superficial and deep reflexes were also normal, and there was no evidence of lesion of the nervous system.

It is interesting to note that the striæ, in their distribution, accorded approximately with the posterior branches of those dorsal nerves which would be related to the diseased areas.

Two months later the striæ had faded somewhat, and were more purple in colour, and again, four months later, they were assuming the white glistening appearance of the striæ gravidarum.

The date and manner of appearance of the striæ cannot be definitely stated. It is known that the skin over the back presented no abnormal feature two days before the crisis, and neither at that time nor subsequently was there any œdema.

The appearance presented by the skin of the back was so striking, that the absence of any mention of the occurrence of such atrophic striæ as a sequel of pneumonia in the standard monographs on that disease naturally led to the conclusion that it must be of some considerable rarity, and further inquiry into the literature of cutaneous diseases brought to light only one similar case, recorded by Barrs in 1891. This was that of a female, aged 18 years, in whom such striæ had developed after an attack of right basal pneumonia: the striæ appeared one by one without preliminary œdema or distension, they were the seat of intense pain, there was no anæsthesia, they occupied the dorso-lumbar region on both sides, and were more numerous and larger on the right side than on the left.

In a careful examination of the skin of over 30 individuals, who, at varying antecedent dates, had suffered from pneumonia, I failed to find any evidence of such a lesion.

The infrequency of atrophic striæ in this connection thus seems to be a reality, and must receive due consideration in any view as to their pathogenesis.

The most frequent type of atrophic striæ—the lineæ gravidarum — is usually regarded as the result of purely mechanical influences, the gradual compression and tension of the cutaneous structures sufficing to produce structural changes in the dermis and epidermis along the lines of natural cleavage, or occasionally in concentric zones. Probably of similar, but more acute, origin are the lineæ atrophicæ traumaticæ described by Abraham.

Apart from such examples, however, as these in which mechanical influences seem to provide the whole ætiological explanation, there remain others in which the pathogenesis is less obvious.

As an occasional sequel of typhoid fever, atrophic striæ are met with over the patellæ, above the knees, on the outer sides of the thighs, and, less commonly, on the outer sides of the legs above the malleoli. In such an example, recorded by Dyce Duckworth, the skin about the striæ was hyperæsthetic, and in one recorded by Shepherd, the initial lesion appeared to be atrophic maculæ which gave rise to striæ by fusion; they have also been recorded as occurring over the abdomen. Following appendicitis, similar striæ have been noted over the patellæ, in which sequence their pathogenesis has been sought by Parkes Weber in the stretching of the skin by flexion of the knees, at a time when the patient is rapidly growing, and the nutrition is greatly affected. Generalised striæ have been met with after scarlet fever, and also in young adults without apparent cause.

In an interesting paper, Rolleston records a case of widespread malignant disease of the peritoneum and pleuræ with extreme emaciation, in which atrophic striæ appeared on either side of the spine from the dorsal to the sacral region. For their causation, whilst admitting the possibility of a neurotrophic factor in the implication of the sympathetic nerves by the new growth, he regards malnutrition of the cutaneous structures, and mechanical traction exerted on the dermis in the operation of turning the patient in bed, as the probable ætiological factors.

It has also been suggested by Bouchard that, even in the case of the post-febrile striæ, over-distension of the skin from the rapid increase of tissue after fevers might be the immediate causal factor. A study of the recorded cases, however, does not appear to support this view, and, further, the relative infrequency of atrophic striæ is an obvious difficulty to the general application of the purely mechanical influences to their pathogenesis. Such mechanical influences as may be so regarded, being manifestly more or less constant in all cases, the rarity of atrophic striæ would seem to imply the necessity of some other factor rendering the cutaneous structures peculiarly vulnerable, which may be malnutrition, or of a neurotrophic nature—a possibility which receives some support from the distribution of the striæ, in many cases, being in accordance with the cutaneous distribution of the nerves, whose sympathetic complements are in relation with the diseased area.

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THE TREATMENT OF WRY-NECK BY LENGTHENING THE STERNO-MASTOID.

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[With Plate III.]

IT is usual to treat those forms of congenital and acquired wry-neck, which are chiefly due to real and chronic shortening of the sterno-mastoid, by division of that muscle either subcutaneously, or by the open method. The results are by no means always good, partly owing to the difficulty of keeping the head in the over-corrected position during the later stages of healing, when the newly-formed fibrous tissue, which fills the gap in the divided muscle, slowly but very powerfully contracts. It is true that this contraction may be minimised by the constant use of well-designed orthopædic appliances, but these are not always procurable for poor patients, and they usually need careful and intelligent supervision. There are many objections to the use of a plaster of Paris case, especially for poor children. Anyone who has helped to remove one of these splints, after it has been worn for some weeks, will remember some of their most obvious disadvantages. Moreover, these unclean and rigid cases prevent those active and passive movements, which are essential for the complete success of orthopædic operations.

For slight degrees of deformity, subcutaneous tenotomy may be efficient and safe in skilled hands, and in these circumstances, it has the merit of leaving no visible scar, but it is not suitable for most cases. It is difficult to divide the clavicular head of the sterno-mastoid and the deep layer of its sheath, without running the risk of wounding some of the important vessels at the root of the neck, especially the internal jugular vein.

It is far better for the surgeon to make a wound large enough to enable him to see what he is doing, and how best to avoid wounding the large vessels and nerves, which are in contact with such shortened structures as the scalenes, the levatar anguli scapulæ, and the various layers of the deep cervical fascia. It is now generally admitted that an open wound is essential for the thorough and safe division of the contracted structures in nearly all cases of wry-neck.

Surely it is wise to take the fullest advantage of the wound, by making the operation as complete and as accurate as possible. Therefore, the writer lengthens the sterno-mastoid instead of merely dividing it, and leaving the gap to be filled up with a mass of contractile new material. Moreover, every care is taken to prevent the accumulation of blood in the wound, and to avoid septic infection, for these are two additional causes of the formation of an excessive amount of fibrous tissue, where it is important to have as little as possible.

Considering that tendon-lengthening is a very successful operation for talipes, it is curious that the advantages of a similar operation for wry-neck have not been appreciated. Whitman, in the latest edition of his excellent and comprehensive work upon orthopædic surgery, does not even mention it.

The main object of this paper is to recommend a particular method of lengthening the sterno-mastoid, which the writer has found to be far more satisfactory than mere division of the muscle. The operation is fully described in the following account of one of the cases for which it was adopted.

A. P., æt. 8, was referred to me by an old Guy's man early in January 1905. There was a history of wry-neck since infancy, but the deformity had increased of late in spite of treatment by exercises and forcible manipulations. The parents had deferred operation, because the patient was their only child. The left sterno-mastoid was active, but careful measurements showed it to be two inches shorter than the right. The trapezius was only slightly contracted. The deformity was very evident, and caused the growing child so much mental distress, that she was very anxious to have something done to correct it.

The right side of the face was a little larger and more convex than the left, and the right ear was a little longer. There was a moderate amount of lateral curvature of the cervical spine to the left, and a very slight and opposite deviation of the dorsal vertebræ was noticed.

Operation.—A curved incision was made across the lower end of the left sterno-mastoid, which was carefully separated from the vessels beneath it. The sternal tendon was detached from the bone, and separated from the clavicular fibres, which were then divided obliquely upwards and backwards as shown in Fig. 1.

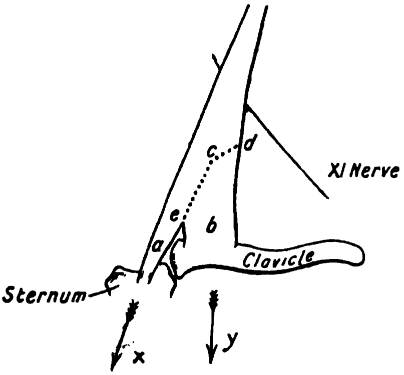

Fig. 1.—*Lengthening of the sterno-mastoid (left).*

x = Arrow showing direction of traction of the sternal head, a.
y = Arrow showing direction of traction of clavicular head, b.

a *is detached from the sternum, and separated from* b *along the dotted line* e, c, d. *The sternal head has far more rotatory power than the clavicular, especially in wry-neck.*

The dense and shortened deep layer of the sheath of the sterno-mastoid was dissected away from the carotid sheath, and all of it that could be exposed was excised to prevent reunion and recontraction.

Attempts were then made to correct the deformity, but the ascia covering the scalenes, and the levatar anguli scapulæ, resisted, and required careful division.

The muscles were stretched until some of their fibres were seen to tear. The anterior fibres of the trapezius were also stretched and kneaded until they gave way, and it became possible to over-correct the deformity. While this position was maintained the two heads of the sterno-mastoid were sewn together with catgut sutures without any tension (Fig. 2 (*see next page*)).

All bleeding was arrested, and the wound was carefully dried and closed. The head was bandaged in the over-corrected position. A few days later, a simple apparatus was applied with the same object, and this was worn day and night for six months after the operation.

It consisted of two bands of strong webbing sewn together, one passing under the lower jaw and over the top of the head, the other going round the forehead and the occiput. Each strap was tightened by means of a buckle, and to the horizontal one a ring was attached above the left mastoid bone. From the ring a strong rubber accumulator

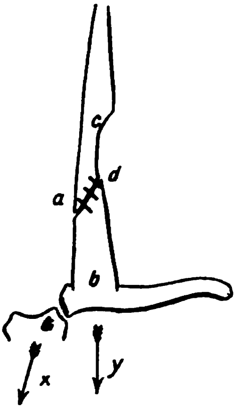

Fig. 2.—*Lengthening of the sterno-mastoid (left).*

x=*same as in* Fig. 1.
y=*same as in* Fig. 1.

The sternal tendon, a, *is displaced and attached to the clavicular head,* b *at* d, *thus lengthening the muscle to the required extent. The direction of traction of the muscle is deviated very considerably outwards.*

stretched behind the back obliquely downwards, and to the right side of a fixed waist belt. The accumulator maintained the over-corrected position of the head. Active and passive movements were carried out systematically twice daily from the first week. The result can be seen to be good by looking at the photograph (Fig. 3). There is no kyphosis of the cervico-dorsal spine, and no lateral curvature. Moreover, the left sterno-mastoid is a powerful muscle with an extensive range of movement. The scar is more obvious than usual, a keloid having developed in the wound possibly as a result of the early and vigorous movements which were employed; moreover, a subcuticular stitch was not used for this patient.

It may be noticed that the rotatory power of the sterno-mastoid is purposely lessened by detaching its *inner* tendon from the sternum, and fixing it to the obliquely divided clavicular head (Figs. 1 and 2). In this way the axis of the muscle in considerably deviated, so that it pulls the mastoid process towards the clavicle and not towards the middle line of the sternum. Tilting of the chin is therefore less likely to recur after this operation than when the sternal attachment regenerates, as it does after any kind of tenotomy.

It is of great importance to arrest all hæmorrhage and to prevent infection of the wound, so as to avoid the formation of too much fibrous tissue in the deep parts of the wound.

If these precautions are taken, and the shortened muscle made a little longer than its fellow, the chances of recurrence

PLATE III.

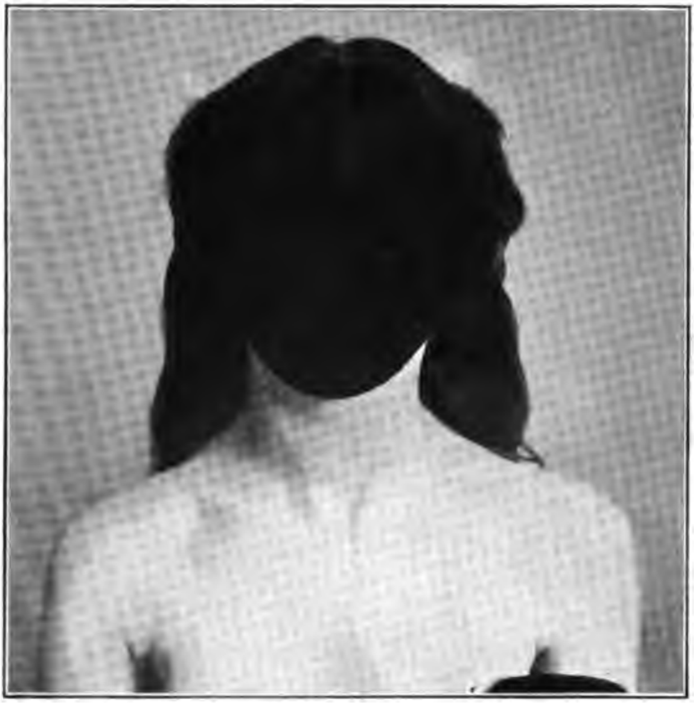

Fig. 3.—*The left sterno-mastoid, which was two inches shorter than the right, was lengthened in January* 1905. *The deformity has been corrected, and the affected muscle is powerful and useful.*

of the deformity are reduced to a minimum, so that the use of apparatus becomes of comparatively less importance.

Still it is wise to use it for several months in order to counteract the contraction of the scalenes, the deep fascia and the ligaments of the vertebral column. Moreover, it must not be forgotten, that bony changes have developed in late cases, the bodies being shorter on the side of the contraction. It is of great importance to operate before these secondary changes have become serious enough to prevent complete recovery.

In many cases the trapezius needs division, and this can be done near the skull where the scar becomes hidden by the hair.

The lower end of the sterno-mastoid is selected for the lengthening for several reasons. The scar is less conspicuous; the nerve supply of the muscle from the spinal accessory and the second cervical nerve is not likely to be damaged, even if the splitting needs to be extensive; the axis of the muscle can be deviated to counteract the many forces that tend to cause recurrence of the deformity, and lastly it is far easier to operate upon the lower end, where the muscle is bifid.

A curved incision running across the sterno-mastoid near its lower end, gives good access to the deep structures, and leaves a scar which can be easily hidden, but care has to be taken of the external jugular vein which may cross the wound. A vertical wound placed between the two heads of the sterno-mastoid makes splitting easier, but the scar is more conspicuous, although it falls into a furrow in front of the clavicular head after the sternal tendon is displaced at the operation. A subcuticular suture should be adopted to lessen scarring.

In conclusion, it may be urged that, for real and chronic shortening of the sterno-mastoid, lengthening of the muscle is a more perfect and more successful operation than mere division of it, and that a good result is less dependent upon laborious and intelligent after-treatment. Perfect results are not obtainable in neglected cases with serious secondary changes in the skeleton.

SOME RECENT ADVANCES AGAINST THE TUBERCLE BACILLUS.

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It is now a quarter of a century since the discovery of the tubercle bacillus by Koch, and recent investigations have been so numerous and revolutionising, and so beset with controversy, that it may be useful to briefly review the subject in its more practical aspects.

We may group the recent work under three headings:—

(1) The *Avenues of Infection*, whereby the tubercle bacillus gains entrance to the body.

(2) The *Intercommunicability of the Human and Bovine types* of tubercle bacillus.

(3) Treatment by the production of *immunity*, with or without the aid of the *opsonic index*.

I.—The *Avenues of Infection*.—That is to say, do we become infected by inhaling the tubercle bacillus or by swallowing it? The original view, supported by the inhalation experiments of Koch, that the lungs always became infected by direct *inhalation* of bacilli in dust, etc., has been weakened by modern work in several directions, (1) By finding (as described below) that fine particles can reach the adult lungs more readily by swallowing than by inhalation; (2) That in the disgusting habit of expectoration in the streets, any tubercle bacilli in the sputum are probably killed by the light and air before they are dried into dust.

But we cannot be sure of this, and, at any rate, one cannot doubt that, in dark and stuffy rooms, the tubercle bacillus will survive for months in a virulent condition. Neither can the inhalation of fresh germs in the fine spray produced by the coughing of a consumptive patient be considered free from grave risk (Flügge).[10]

But the trend of recent experiments favours the bowel as the most fertile avenue of infection, and especially the bowel of the infant. Indeed, no less an authority than von Behring[14] has for years advocated the extreme view that the infant's bowel is the chief portal of infection, and that adult tuberculosis is generally due to the lighting up of tubercular foci which have been kept quiescent since infancy. He brings evidence that the bowel wall of the infant is certainly very permeable.

Of the greatest interest, in this connection, are the following recent experiments by Vansteenberghe and Grysez[11] from Calmette's laboratory.

They find that in rabbits, which have been made to breathe a very smoky atmosphere, the lungs do not become blackened if the gullet is first ligatured.*

Also, that in *adult* guinea-pigs, which have been fed with food containing lamp-black or Chinese ink, the lungs after one or two days show blackish islands, scattered over the upper and along the borders of the lower lobes. The mediastinal glands are blackened, but the mesenteric glands are unaffected.

If the same experiment is repeated in *young* guinea-pigs, the mesenteric glands are blackened, but the lungs show no pigmentation. This is apparently due to the mesh-work of the juvenile mesenteric glands being finer, and thus proving a more efficient filter.†

If cultures of tubercle bacilli are fed to goats and kids, the same difference in permeability of the adult and juvenile mesenteric glands can be demonstrated.[9]

Naturally, experiments such as these have had great influence in changing opinion in the past year or two from the inhalation theory of infection towards the view that the *tubercle bacillus gains entrance generally by the bowel.*‡

Here, specially in the young, it may be arrested at the mesenteric glands, or it may be passed (in the adult) on the seed, is inherited.) Whenever, therefore, there is no strong reason to the contrary, it is obvious that milk must always be heated sufficiently to kill any tubercle bacilli which are only too likely to be present. That is, to 95° C. for 1 minute, or 70° C. for 30 minutes (18, p. 67). This is the more essential for children and those hereditarily predisposed.

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* Similar results with charcoal fed to rabbits originated, in 1905, from the St. Thomas's Hospital Laboratory. (2, p. 144.)

† Since this paper was written these experiments have been confirmed by Whitla and Symmers. The able review of the clinical bacteriology of the tubercle bacillus by Sir W. Whitla[17] must be consulted, as also his striking instances of the infection of school children by tubercular milk.

‡ The tonsils must be considered sometimes to give admission to the tubercle bacillus, for excised tonsils are tubercular in 8 per cent. of cases.[18]

III. *Treatment by Production of Immunity.*—Under this heading will be included *Active and Passive Immunity* in animals and men, together with some recent *diagnostic methods*, and opinions upon the *Tuberculo-Opsonic Index.*

Behring has of late immunised thousands of calves by injecting into their veins a culture of human tubercle bacilli, which are but slightly virulent to the calf.

This is repeated in six months, and the resulting immunity lasts for years, and probably for life.*

These cows will, at any rate, supply pure milk, and in the hope that their milk contains *immune* bodies, it is now being supplied to consumptive patients. Behring also gives, by mouth, to these patients a chloral extract of tubercle bacilli, called *Tulase.*

Numerous attempts have been made to produce *passive immunity* † in tubercular patients, by injecting them with the blood-serum of animals, in which active immunity had been produced by the inoculation of tubercle bacilli or their products, but all these sera have been failures.

Raw[7] is now trying the injection into patients of the serum of tubercular cows, the serum having first been shown, by injection into guinea-pigs, to contain no bacilli.

But, at present, the chief hope of fighting established tubercular disease seems to be centred in the future of *tuberculin.*

Koch's original tuberculin (T.O.) consisted of the products of the growth of the tubercle bacillus in broth.

The new (1897) tuberculin (T.R.) is composed of the actual bodies of the tubercle bacillus finely disintegrated.

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* Thus by supplying the cow with a vaccine of *human* origin, we have repaid the debt which we have so long owed the cow for supplying us with a vaccine of *bovine* origin against small pox.

† *See* footnote on p. 415.

T.O. has proved invaluable* as a diagnostic re-agent in cattle. When properly applied, this tuberculin test has an error of only 5 per cent.

T.R. is nearly always selected for therapeutic purposes, and there are three methods of using it :—

(1) The Continental, where the patient is educated to tolerate enormous doses of tuberculin, which is gradually increased from $\frac{1}{5000}$ mg. up to even 20 milligrammes.

(2) Wright's method of minute doses ($\frac{1}{5000}$ to $\frac{1}{500}$ mg.) where the dosage and intervals of the injections are regulated solely by their effect on the opsonic index.

(3) The same tiny doses regulated by experience and clinical effects, without the opsonic index.

In 1901, Koch issued another tuberculin (bacillary emulsion) consisting of a mixture of T.O. and T.R., but this is not much used.

Calmette uses the alcoholic precipitate from tuberculin dropped under the eyelid as a diagnostic test for tuberculosis. If the conjunctiva reddens, the patient is considered to have a tubercular focus somewhere, either active or latent. This test is a valuable one, and has an accuracy which can only be guessed (as there is no way of proving the presence or absence of small tubercular foci) as about 90 per cent.

Unfortunately, the test is scarcely justifiable, except when diagnosis is of urgent importance, because the residual slight inflammation is sometimes rather persistent, and although the eye may clear up, I know of two cases in which, after an interval of recovery of a few weeks, the eye has developed (1) severe keratitis, (2) granular conjunctivitis persisting for a few months.

In strumous children, who are specially liable to keratitis, the danger of this increased vulnerability is a serious one, though it must be of rare occurrence.

Possibly, if this ophthalmo-reaction falls into disfavour with children, the cutaneous reaction of von Pirquet may take its place. It consists in the appearance of small papules a day or two after the vaccination of the skin with T.O. Four little areas of skin are scratched, and tuberculin (25 per cent.) is rubbed into two places, and the other two spots are left as controls. It is said to be relied upon in children, but not in adults.

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* Its use has been much restricted recently in the State of New York, owing to the loss inflicted on herds.

The subcutaneous *tuberculin test* is probably not as much used in this country as it should be. It is very trustworthy, and, when carefully carried out, is described as "probably free from risk," but it involves the injection of $\frac{1}{10}$ mg. of tuberculin (T.O.), and, if no temperature reaction follows, the dose is successively raised to 3, or even 10, mg. And when one knows that a patient is occasionally considerably upset (headaches, fever, vomiting, malaise, or drowsiness), by such small doses as $\frac{1}{1000}$ mg. (T.R.), the dosage required by the tuberculin test seems very formidable. But Moeller states that, after 20,000 injections, he has never seen disseminated tubercle as a result.

Other recent methods, which are claimed to be diagnostic of tubercle, are (*a*) an opsonic index outside the normal limits (·8 to 1·2), (*b*) a transient fall, followed by a more persistent elevation of the opsonic index in response (1) to an injection of tuberculin, (2) to auto-inoculation produced by exercise, massage, or Bier's treatment. (*c*) The agglutination test of the patient's serum on an emulsion of tubercle bacilli. This has not been used so much in this country as in France. (*d*) Finally, there is the valuable, but very elaborate method, which utilises the "deviation of the complement." This has been well described by Emery.[4]

So much for the modern diagnostic methods. Now with regard to the *vaccine treatment* of tuberculosis, it will have been noticed that the method, chiefly used in this country, of minute doses of T.R. ($\frac{1}{5000}$ to $\frac{1}{500}$ mg.) at infrequent intervals (1 to 2 weeks), is entirely the outcome of measurements of the opsonic index* which Wright found could be maintained at a high level better by such small doses than by the large doses formerly in vogue.

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* It is scarcely necessary to say nowadays that opsonins are curious antibodies present in normal blood serum on which depends our immunity against most bacteria. For, unless the opsonins have rendered the bacilli tasty and acceptable to the white corpuscles, no phagocytosis can occur. The index is the ratio of the numbers of bacteria engulfed by 100 leucocytes in virtue of the opsonins in the sera of the patient, and of some healthy person.

The brilliant work of Wright and his fellow-workers has had a profound influence on our present conceptions of the intimate processes of immunity, both local and general, and upon the vaccine treatment of bacterial invasion.

And the opsonists declare that vaccines against a powerful and slow-reacting bacillus, like the tubercle bacillus, should never be employed without the laborious guidance of the opsonic index, lest a dangerous depression of the index should be produced by wrong dosage.

At the present moment, a fierce controversy over the whole subject of opsonic indices, and their clinical application, is being waged, and the position is an extraordinary and interesting one. During the past two or three years, a large number of workers (including myself on a small but time-consuming scale) have tried to follow in the footsteps of the original opsonists. I soon found that, on repeating the counts of the same pair of slides, one got an absolutely different index. Strangeways and his co-workers[8] then tested the method most thoroughly and conscientiously (August 1907), and found that it yielded utterly inconsistent results, which were worthless as a clinical guide.

Then Reyn and Petersen (March 1908) tested the method on a large scale at the Finsen Institute in Copenhagen after learning the technique in Wright's laboratory. They concluded that—

(1) Lupus patients (408 indices) have not on the average (1·03) a low index (con. Wright).

(2) Injections of T.R. do not, on the average, increase the index, nor did they improve the lupus (con. Wright).

(3) Effect of T.R. injections on the index was so uncertain that the index has been valueless as a guide to treatment.

Next Barnes,[6] June 1908, started as a Research scholar to study the opsonic index in rheumatic fever, etc. After practice, he was able to get consistent results with Wright's method, but directly he began to work with secretly numbered slides (eliminating sub-conscious bias), his indices became discordant and valueless. By an intensive method, he obtained consistent results, but they were not confirmatory of Wright's positive and negative phases.

These discrepancies cannot be entirely due to technique, but must be chiefly due to the counting of the ingested bacilli. For the difficulty has been narrowed down to this compass that slides, prepared and stained by an acknowledged expert, may be counted by him, and yield consistent results, and then be handed on to skilled and conscientious pathologists (who are not true believers), whose counts will give discordant and worthless indices. This is a very extraordinary position, and I can only make the very inadequate suggestion that the counting is not entirely a mechanical process, but that to compare arithmetically the phagocytic strength of two groups of cells involves the art of reviewing, and requires knack and experience.

Another awkward fact for the opsonic doctrine is that babies do not appear to depend on opsonins for their bacterial defence, but often thrive on an index of ·01. (Wells.[1]) (Perhaps opsonins develop late in ontogeny, because they were evolved late in phylogeny.)

But, in spite of the brave show which the opsonists are still making (as in THE PRACTITIONER of May 1908), the opsonic Goliath is assailed by an increasing number of Davids, whose onslaughts, combined with much practical shortcoming of theoretical assurances, have tended to produce widespread distrust as to the practical value of the opsonic index. Some go so far as to deny its existence. Provisionally, this is probably much safer than to rely upon it. But, as a method of research in the best hands, it is scarcely possible to deny its trustworthiness, and the great value of the lessons it has taught us.

As to the very large question of the *results of vaccine** *treatment* against tubercle, it may be said that in phthisis, specially if early, and localised, and afebrile, treatment by

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* A *vaccine* (*e.g.*, tuberculin) is still frequently confused with a *serum* (*e.g.*, diphtheria anti-toxin). A *vaccine* is a preparation of a bacillus, or its toxins,

T.R. in some cases may do much good, though it is often hard to eliminate the co-effects of fresh air, and good food, etc. Some[7] prefer T.R. made from the bovine bacillus, others speak very highly of Béranek's tuberculin. But as yet tuberculin has accomplished nothing wonderful in phthisis, and against the good it often produces must be discounted the harm which so powerful a double-edged sword is certain sometimes to do.[15] For we are only on the threshold of our knowledge of those intimate processes of immunity which may be stirred to their depths by vaccines such as tuberculin. It is rather like starting a stopped watch by raking about the works with a pin. You may succeed brilliantly, or you may damage seriously the delicate and mysterious machinery of immunity.

In localised tuberculosis, elsewhere than in the lungs, T.R. in tiny doses ($\frac{1}{5000}$ to $\frac{1}{1000}$) at one or two weeks' interval, with or without the opsonic index, often produces striking improvement in chronic, stationary, or retrocedent cases. More commonly absolutely no effect whatever seems to be produced, or occasionally the patient is temporarily upset. My best case was a boy with intense headache, and vomiting, optic neuritis (and hence presumably cerebral tumour), with albuminuria, and tubercle bacilli in the urine. With T.R. (and hospital) he got well, and now for a year has had nothing the matter with him, except slight residual optic atrophy.

Raw (February, 1908) reports[7] astonishingly good results in every kind of tubercular affection. Four cases out of 6 of apparently tubercular meningitis were cured, and other results on the same scale, with never the slightest bad effects. He gives 12 weekly injections, increasing from ·0001 to ·01 mg. of T.R., human or bovine.

which, when introduced into the body, produces "active immunisation" by stimulating the production of anti-bodies (*e.g.*, opsonins).

A *serum* produces "passive immunisation" in man by virtue of the anti-bodies, which have been already developed in it by the horse in response to diphtheria vaccines.

Thus, in anti-sera, the anti-bodies are ready made, and resemble ready-made garments in being immediately available, but liable to misfit.

Vaccines, on the other hand, stimulate the production of anti-bodies, which are made to order on the premises, but they take a little while to make. Vaccines are dangerous weapons, because they consist of the same toxin as that which already threatens to overwhelm the patient.

On repeating his method, in 2 cases of adult afebrile phthisis, there was decided improvement, but, in a case of lupus of the toe, the benefit of the early doses was neutralised by the constitutional and local disturbance on increasing the dose to $\frac{1}{1000}$ m.g.

Similarly, a child with bronchiectasis (reacting to Calmette's test) improved at first, but seemed upset half-way through the series of injections, which I consequently abandoned.

Latham,[8] so recently as April last, has demonstrated the value of *T.R. by mouth* in doses of about $\frac{1}{2000}$ mg. at varying intervals (a week or so). He has also indicated (with the help of Drs. Inman and Spitta) that the opsonic index, in febrile cases, generally varies inversely as the temperature, and that a high or low index may be guessed from the clinical symptoms. But it is impossible to do justice here to this valuable paper, which should be read by all who employ the T.R. treatment. Incidentally, the paper is striking testimony in favour of the accuracy and utility of the opsonic index.

Very recently [8] T.R. $\frac{1}{5000}$ mg. t.d.s. has been given per os by Dr. Hector Mackenzie with good effect on the appetite, and on tubercular glands in the neck. But the oral method has scarcely been worked out yet.* In animals, it has been shown experimentally that immunity may be produced in this way, but only if the vaccine is given on an empty stomach.

E. C. Hort [13] and Vere Pearson have supplemented its action by horse serum (by mouth) with promising results.

The large-dose method of tuberculin treatment, which has been in use for many years on the Continent, is considered to have improved the curability of phthisis a little, and the sanatorium cures are rather less liable to relapse. But there has been no very decided improvement in results. The tuberculin treatment of phthisis by any method is far more risky [16] and uncertain† than of other forms of chronic tubercular disease. In these latter cases, its cautious and experienced employment will often produce improvement, or even cure, where other means have failed. But such brilliant results, as the enthusiasts (who rather monopolise the literature) would lead one to anticipate, must not be expected.

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* In a child with quiescent tubercular arthritis (under the care of Miss Murdoch), I found that the marked "spike" on the temperature chart, which always followed the subcutaneous injection of T.R. ($\frac{1}{2000}$ to $\frac{1}{4000}$ mg.) was never present when a much bigger dose ($\frac{1}{1000}$) had been given by mouth on an empty stomach. Thus the oral method was much less potent.

† Edward Squire[15] deprecates the use of T.R. in phthisis, quoting three cases in which, with all the precautions advocated by Wright, it appeared to light up quiescent mischief in the lungs.

In phthisis, whatever the method of treatment, success depends on early diagnosis. The closed cases, before ulceration commences, give very good results. There is a fatal misconception very prevalent in the profession that it is a sign of incompetence to be unable to diagnose phthisis in its earliest stages by physical signs. It cannot be too clearly realised that the disease may be months old before the most carefully trained ear can detect its presence. Hence the vital importance of some form of tuberculin test. That the healing of unrecognised tubercular foci is of frequent occurrence is shown by their presence in 30 to 60 per cent. of post-mortems.

Probably the highest art in the treatment of phthisis consists in the control of the patient's own *auto-inoculation*, as elaborated by the brilliant work of Drs. Paterson and Inman at Frimley,[13] with the aid of the opsonic index. In a convalescent phthisical patient, exercise will cause a liberation of toxin (tuberculin) as indicated by a rise of temperature and a fall of the index. Exercise is very gradually increased so as to educate the patient to tolerate increasing doses of autotoxin, and thus to increase his resisting power to tubercle. It is the tuberculin treatment, but the patient makes his own tuberculin. Looking back over the whole subject, it is clear that the possibilities of preventive medicine in this disease are enormous. This is especially so if it should turn out that tubercular cows' milk is the main source of infection, and that inhalation of bacilli is of small account. For then it might be merely a matter of either vaccinating every calf against tubercle, or killing every milch cow which reacted to tuberculin (some 30 per cent.). If this is too much to expect as yet, then at all events the 2 per cent. of cows with tubercular udders should be slain without delay.

And even if, as is probable, tubercular cows' milk is by no means the only source of infection, a non-tubercular milk supply would probably * enormously diminish the amount of tubercular diseases in children, which now occupy about one-third of the beds in any children's hospital. This in itself would justify a very large expenditure. Could not the experiment be tried on some small island community?

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* Tuberculosis is stated to be very prevalent in China, where cow's milk is hardly used.[17]

In view of the suffering and enormous aggregate expense entailed by tubercular diseases, the present state of our knowledge appears to justify the community in demanding a non-tubercular milk supply. In the meantime we must wage war on sputum, and accumulate facts.

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PYELITIS DURING PREGNANCY.

BY H. T HICKS, F.R.C.S.,

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PYELITIS, occurring during pregnancy, is a condition which deserves more notice than most text-books on obstetrics devote to it. A want of knowledge as to the causes of pyuria in pregnancy may not only lead to a serious error in diagnosis, but failure to grasp its importance may lead to an equally serious mistake with regard to the prognosis. There can be little doubt that the incidence of pregnancy renders the urinary tract more vulnerable to bacterial invasion. Most probably this is due to hyperæmia and urinary stasis, the result of pressure. Pregnancy will light up chronic renal mischief, and, in many instances, subjects of chronic interstitial nephritis, or calculus, show their first symptoms during pregnancy. In any given case of pyuria occurring during pregnancy, we must always be careful to inquire into the past history, for one might be dealing with a chronic renal lesion which is merely stimulated into activity by the pregnancy. But, apart from any pre-existing lesion, the kidney pelvis frequently becomes infected during pregnancy. In the greater number of cases, the bacilli gain an entrance into the renal pelvis directly from the colon. Whatever may be the path of infection of true pyelitis of pregnancy, it seldom seems to ascend from the lower urinary tract. In a few cases, the pyelitis is secondary to cystitis, but if this is so, both sides, as a rule, are affected, while, in ordinary simple pyelitis of pregnancy, the infection is nearly always confined to the right side.

Simple Pyelitis of Pregnancy.—I have seen ten cases of this condition. Constipation was well marked in each case, and it is supposed that the renal pelvis is infected from the colon, the path of infection being probably the lymphatics. In nine of the ten cases, the colon bacillus was present in pure culture, the one exception being a case of pyonephrosis, which developed in the early stage of the second pregnancy in a patient, who had previously had an acute attack of pyelitis during the last two months of her first pregnancy. In this case the primary infection may have been due to the bacillus coli, the subsequent trouble being due to a secondary staphylococcal invasion.

Constipation must therefore be looked upon as the primary exciting cause of the infection, and the pressure of the pregnant uterus on the ureter, and the accompanying hyperæmia, as the predisposing causes. It is not easy to see why the right ureter should be almost invariably affected, but probably the natural inclination of the pregnant uterus to the right, coupled with shielding action of the rectum on the left side, may account for this right-sided frequency.

The symptoms and course of the disease are very definite. Usually, while in the fifth, sixth, or the seventh month of pregnancy, there is sudden acute pain in the right renal region behind, and, at the same time, the temperature rises to 102° to 103° F., and there may be some sickness. Rigors during the initial stages are rare, but may occur later, when they are of grave significance. Pus may not be present in the urine until from 24 to 48 hours after the onset, and even then will be present in small quantities only. Several specimens should be centrifugalised for microscopical examination before a definite opinion is given as to whether pus is present or no.

The reaction of the urine will be acid, and the amount of pus passed greatly vary from day to day. Other than a little frequency of micturition, there are seldom any bladder symptoms, and the infection does not seem to spread often in a downward direction. The pyuria may persist for some weeks after the pyrexia and pain have disappeared. As a rule, the pain and pyrexia continue more or less severe till about the 10th day, when the temperature begins to oscillate, and will probably reach to about normal in a fortnight or sixteen days. The pain in a great measure follows the course of the temperature. Any undue prolongation of the symptoms must excite a suspicion that the infection has either invaded the substance of the kidney, or has spread to the perirenal tissues.

Of course the symptoms may greatly vary in severity. In some cases, in which toxic absorption is severe, the patient presents the general hectic appearance of typhoid fever, but if the absorption is mild the general condition remains good.

The Prognosis.—There was no mortality among the ten cases I saw, and the general opinion of those who have written on this subject seems to show that the prognosis is good, but fatal cases have been recorded. Death, when it does occur, is due apparently to renal pyæmia. Eight out of the ten cases completely recovered after about three weeks. One developed a pyonephrosis during the second pregnancy, after having had a typical attack of pyelitis during the former. The urine in this case was examined during the two years interval between the pregnancy, and was found to contain pus in small quantities on several occasions. The first attack, therefore, probably left the renal pelvis permanently damaged, and although the patient's health did not suffer greatly, the quiescent infection at once flared up when she fell pregnant the second time. The other case, which ran a complicated course, was under the care of Dr. Newton Pitt, in Guy's Hospital, and I am much indebted to Dr. Pitt for his kindness in granting me permission to use the case. I was asked to see the patient by Dr. Hertz, and we came to the conclusion that she was suffering from right-sided pyelitis of a rather virulent form.

The patient, aged 24, had been married two years, and had had one miscarriage at the fourth month, about a year previously. At the fifth month of her present and second pregnancy, she was seized with severe pain in the right lumbar region, and was admitted into hospital a fortnight later. The temperature was 103° F., the tongue furred, and she appeared to be in a typhoid state. There was great tenderness over the right side of the abdomen, but the maximum point of pain and tenderness was behind, just below the twelfth rib. There was also some rigidity over the area of pain, and the skin was intensely sensitive to the least touch. When first admitted, the case was thought to be one of appendicitis. The urine was acid, and contained a fair amount of pus.

Subsequently a pure culture of the colon bacillus was obtained from the pus, and the urine found also to contain epithelium and granular casts. The urinary output was not markedly diminished, and there were no bladder symptoms. A leucocyte count showed 25,000 per c.m. of blood.

The patient did not improve on milk diet, urotopine, and rest, and, at the end of 43 days, the temperature, pain, and pyuria showed no sign of abating. By this time she had considerably wasted, and the pulse became feeble as well as rapid. Vomiting was fairly frequent, but the pregnancy progressed. Dr. Pitt decided to have the right kidney explored, to which the patient gave consent.

The operation took place on the forty-third day of the disease, and the kidney was found to be studded with numerous small abscesses. The patient was so bad on the table that nothing more than drainage was attempted. The temperature became a little lower during the next few days, when a vaccine, prepared from the patient's own bacilli, was injected, the vaccination being repeated in a few days. The temperature gradually came down after the first injection of the vaccine, and reached normal on the seventy-second day of the disease, the general condition correspondingly improved. The pyuria, however, persisted, but premature delivery took place on the seventy-seventh day, which event was quickly followed by a complete disappearance of the pus. The child was premature, but was alive and healthy when born. This case is reported in full by Dr. Herbert French in his Goulstonian Lectures for 1908. I only saw the patient during the first few weeks of her illness, but I believe the real reason why the disease ran such a virulent and prolonged course was because of want of drainage, but it is clear from the chart that the vaccine had some effect on the abatement of the pyrexia, although the patient began to improve soon after the operation.

Effect on the Pregnancy.—Three of the ten cases miscarried. Two did so during the height of the attack, and the miscarriage was followed by rapid recovery. The other case is the one quoted above, and in this the pyuria disappeared almost immediately after delivery. There is thus a tendency to premature labour, and since this is frequently followed by a marked improvement in the patient's condition, it becomes fairly certain that artificial induction should be resorted to, if the case does not follow a satisfactory course.

The Diagnosis.—In the early stages pyelitis is likely to be mistaken for subdiaphragmatic pleurisy. The extreme tenderness below the 12th rib behind, and the tendency for the pain to spread downwards along the course of the ureter, and a careful examination of the urine, coupled with the knowledge that pyelitis with pregnancy is fairly common, should prevent this mistake. A little later the question of appendicitis must be considered, and I think most mistakes are likely to occur in distinguishing between pyelitis and appendicitis. The history of the onset of the pain, beginning as it does beneath the 12th rib and spreading downwards in pyelitis, the absence of great rigidity and of swelling, together with the presence of pus in the urine, ought to differentiate between the two conditions. I know of two cases of pyelitis which were operated in mistake for appendicitis. Later still, when the patient has passed into a typhoid condition, enteric fever may be suspected. The absence of spots, Widal's reaction, and enlargement of the spleen, and the presence of a marked leucocytosis and of localised pain, will settle any doubt that may exist.

Treatment.—The patient should be kept in bed for some time after the acute symptoms have subsided, for there is tendency to relapse if she is allowed up too soon. The diet should be mostly milk and other unirritating fluids, but milk puddings, eggs, and bread and butter may be given to the less toxic patients. Plenty of water should also be allowed for flushing purposes.

Urinary antiseptics, such as urotropine, together with small doses of potassium iodide, as suggested by Dr. Leslie Eastes, should be given by the mouth. The bowels must be at once well opened, and kept in a satisfactory state. Mild cases will not require more than this. When the symptoms do not abate, as a result of this simple form of treatment, a bacillus coli vaccine should be tried. The infection is almost certainly due to the bacillus coli, so that if a vaccine cannot be prepared from the patient's own bacilli, one obtained from another source will probably give satisfaction, although the former vaccine is of course desirable. I think that the course of the disease is largely governed by the question of drainage rather than by the virulence of the infection. Direct drainage of the renal pelvis is too severe an operation, and it seems to me that the best way of effecting free drainage is to remove the cause of pressure on the ureter. In three cases, premature spontaneous delivery was quickly followed by abatement in the symptoms. The labour should be induced by gently passing a bougie into the uterus. There is no need to give an anæsthetic, and, if all antiseptic precautions are taken, no difficulty will probably arise.

Bilateral Pyelitis is far less common than unilateral, and, if it occurs, the infection is almost certain to have ascended from the lower urinary passages. Cystitis is a rare condition in a woman, but it must be remembered that the passage of a catheter is a much more risky proceeding during pregnancy than without it. No better example of the vulnerable state of the urinary tract can be given than by comparing the state of the bladder, during retention of urine due to pressure of a retroverted and incarcerated gravid uterus, with retention due to the impaction of a fibromyoma. In the latter example, a catheter may be passed with impunity for many days, but, in the presence of a pregnant uterus, catheterisation may set up a most virulent cystitis after a few hours in spite of every precaution. Of course urinary stasis plays a great part in the causation, but probably the hyperæmia, accompanying the pregnancy, is also of great importance.

It is rightly stated that the correct treatment for retention of urine, the result ot pressure of a retroverted gravid uterus, is to keep the patient in bed and relieve the bladder by passing a catheter. In most cases, this is all that is needed, and the uterus will probably rise to its normal position spontaneously. If the urine should snow the least sign of cystitis, the uterus must be replaced at once. If the pressure on the neck of the bladder is not relieved, proper drainage is impossible, and it is of the utmost importance to recognise that, within a few days, the infection may rapidly ascend both ureters, and without any warning symptoms or even a rise of temperature, and that the patient may be within a few hours of a gradually oncoming coma followed by death. The following case is a very typical example of this condition.

The patient was admitted into Guy's Hospital, suffering from retention of urine due to the pressure of a retroverted gravid uterus, at about the fourth month of pregnancy. She had been ill for about five days before admission, and the urine was already alkaline, and contained a large quantity of blood. In spite of relief by catheterisation, the uterus remained in its retroverted position. The urinary output was not greatly decreased, and the temperature remained normal. The bladder was washed out on several occasions, and the patient seemed to be progressing fairly satisfactorily. On the seventh day after admission, she began to show signs of drowsiness, and the pulse began to rise slightly. There was no sickness, and beyond the semi-drowsy condition which became more apparent, there was nothing to show that the patient was within twenty-four hours of absolute coma. She died about ten days after admission, and, at the autopsy, the bladder was found to be much thickened, and its mucous membrane in a sloughing condition. Both ureters were affected, and there was a small abscess in the left kidney. Both kidneys were also infected, and smelt strongly of the colon bacillus. One cannot be too emphatic in pointing out the great importance of cystitis during pregnancy, and, if it occurs, immediate steps must be taken to meet this complication. If it is neglected, the infection may rapidly ascend to the kidneys, and the patient who is apparently doing well may pass into a state of coma.

REVIEW OF RECENT ADVANCES IN SURGERY.

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THE SURGICAL TREATMENT OF EXOPHTHALMIC GOITRE.

(Dr. Aimé Paul Heineck, *Surgery, Gynæcology, and Obstetrics*, 1908).—In a most interesting and complete discussion of this disease, Dr. Heineck analyses a series of 519 cases treated by operation. He first draws a most important distinction between the primary and secondary forms of this affection. In the primary form, there is a concurrent development of the goitre and of some of the other characteristic symptoms. In the secondary cases, the symptoms are grafted upon a pre-existent enlargement of the thyroid gland. All varieties of goitre, irrespective of size, type, or state, from simple cysts to malignant tumours, may be associated with the symptoms of exophthalmic goitre; and it is further to be noted that, in all of the secondary forms, excepting those associated with malignant disease, the prognosis is better, both as to recovery from the operation, and as to recovery from the disease.

He then discusses the various theories which have been advanced as to causation:—(*a*) The cardiac theory; (*b*) The compression theory; (*c*) The sympathetic theory; (*d*) The nervous theory; (*e*) The parathyroid theory; (*f*) The thymus theory; (*g*) The thyroid theory.

The Cardiac Theory is defective, because: (1) Those cardiac disturbances that arise in exophthalmic goitre can, and frequently do, occur independently of it, viz., toxic palpitation, and essential tachycardia. (2) They can occur as symptoms in conditions totally distinct from exophthalmic goitre. (3) Cases of exophthalmic goitre occur from which they are absent. (4) In by far the largest number of cases of exophthalmic goitre that have come to the autopsy table, an absence of cardiac lesions has been noted. The few cases, which have had organic lesions have probably been coincidences.

The Compression Theory is untenable, because large parenchymatous, or cystic, goitres can exist for years, and never produce the symptoms of exophthalmic goitre.

The Sympathetic Theory is now advocated by only a few clinicians. Operations on the sympathetic for the relief of the primary forms of exophthalmic goitre have fallen into complete disuse, because of their therapeutic inefficacy.

The Nervous Theory.—The weight of evidence shows that exophthalmic goitre is not due to a constant and characteristic nervous lesion, demonstrable in every case. Post-mortem observations teach us that, in most cases, there is a total absence of anatomical lesions of the cerebro-spinal and sympathetic nervous symptoms, that is, of such lesions as can be revealed by our present methods of examination.

The Parathyroid Theory.—(1) Our knowledge of the physiology and pathology of these glands is as yet limited. (2) Parathyroid therapy is useless in this affection. (3) Shattuck found nothing abnormal in the parathyroid, which he examined microscopically, from exophthalmic goitre patients.

The Thymus Theory.—Though the thymus gland is found hypertrophied in some of the exophthalmic goitre cases which have come to the autopsy table, and though some cases have been apparently benefited by the use of thymus gland substance, yet this theory is not accepted, because (1) Thymus therapy, in the opinion of by far the greater number of clinicians, is useless for the treatment of exophthalmic goitre. (2) Exophthalmic goitre occurs in the absence of hypertrophy of the thymus. (3) Hypertrophy of the thymus occurs in the absence of exophthalmic goitre.

The Thyroid Theory.—Though it has not been demonstrated beyond scientific contradiction, Dr. Heineck believes that, in the thyroid gland, is to be found the sole primary cause of the disease, because :—

1. There is present some structural alteration of the thyroid gland in all cases of exophthalmic goitre. This applies to the secondary as well as to the primary forms of it.

2. Because exophthalmic goitre is the direct opposite of

myxœdema in symptomatology, in pathology, and in therapeutical indications.

3. Because the symptoms of this affection can, to a certain degree, be determined by the ingestion of large doses of thyroid gland substance.

4. Because all medical or surgical measures, which tend to decrease the functional activity, or lessen the volume of the gland, also tend to lessen the severity of the symptoms, or to assist them.

5. Because, in the cases he has collected, recovery from the disease, in rapidity and completeness, has been in proportion to the extent of the gland tissue removed, short of its entirety.

6. Because the symptoms of this affection find their most satisfactory and consistent explanation by considering the condition a general toxæmia, the result of quantitative or qualitative changes, or both, in the secretion of the thyroid gland. The tachycardia, the mental changes, the sweating, the prostration, the increase of body temperature, the diarrhœa, are all symptoms that we find in other intoxications.

TREATMENT.

1. Thyroid gland substance should never be administered in the treatment of exophthalmic goitre. Its use is irrational, and invariably attended by an aggravation of symptoms.

2. Thymus gland substance and parathyroid extract are useless.

3. All forms of medical treatment of this affection, whether hygienic, dietetic, medicinal, organo-therapic, or electrical in nature, are unsatisfactory and disappointing.

4. Serum therapy is, as yet, in an experimental state, but the results are not satisfactory. The substances used are :—(*a*) The serum of thyroidectomised animals. (*b*) The serum of animals treated with increasing doses of thyroid extract. (*c*) The milk, in the dried or liquid form, of thyroidectomised goats.

5. It is now a demonstrated fact that all operative measures, which tend to lessen the secretory activity of the thyroid gland, or to diminish the amount of the thyroid gland tissue, present in the organism, are of value in the treatment of

exophthalmic goitre. That method must be chosen, which, at the time, seems to be the least dangerous without sacrificing chances of success.

The ligation of the thyroid arteries was first recommended, in 1886, by Wolfler, and it has been practised with a certain amount of success. The objections to ligation of two or three of the thyroid arteries are that it does not secure so complete or so permanent mitigation of the symptoms as partial thyroidectomy, and it is as difficult and as serious an operation to ligate the inferior thyroid artery as to perform partial thyroidectomy.

Partial thyroidectomy was performed in 40 cases of the secondary form of exophthalmic goitre without a single operative death. In all the cases but one, there was either marked or complete improvement.

Partial thyroidectomy was performed in 152 cases of primary exophthalmic goitre. There were 11 deaths in this series. All the other cases made either moderate, marked, or completed recoveries. Of the 11 deaths, one occurred on the operating table, one as a result of hæmorrhage, and four from acute thyroidism. Two died afterwards from acute influenza, and the cause of death is not stated in the remaining three.

Partial thyroidectomy is as yet the most satisfactory operation for performance in all cases of exophthalmic goitre, whether primary or secondary in type. The surgeons that have, for the cure of this disease, removed the largest quantity of thyroid tissue short of its entirety, are those that have obtained the very best results, both from the standpoint of the number of recoveries, as well as from the standpoint of completeness of recoveries.

Operators disagree as to the most suitable anæsthetic. Fatalities have occurred with all of them. Kocher recommends local anæsthesia. The Mayos employ general ether anæsthesia in almost all their cases.

One of the dangers of partial thyroidectomy in exophthalmic goitre is sudden heart failure during the operation. (The writer of this review believes that this is quite avoidable by using local anæsthesia.)

The other great danger is "acute thyroidism," which may come on after either partial thyroidectomy, or ligation of the thyroid arteries. In the fatal cases, there is a sudden rise of temperature to 105°—106° F., a very rapid pulse, extreme excitability and restlessness with great anxiety and distress, profuse sweating, and finally collapse, and death from heart failure. Sudden poisoning by excessive absorption of thyroid juice is probably the explanation.

Free drainage of the operative wound is our most serviceable weapon for combating this complication.

Early operations give the best results. The final conclusions are that partial thyroidectomy is indicated (1) in all cases of secondary exophthalmic goitre; (2) in all cases of primary exophthalmic goitre,

(*a*) When after three months of proper medical treatment, the patient's condition is not markedly improved.

(*b*) When tachycardia is marked.

(*c*) When exophthalmos is so marked as to prevent complete closure of the lids during sleep, as there is a danger of loss of the eyesight from ulceration of the cornea.

(*d*) If the patient is losing strength.

(*e*) When the goitre compresses, or distorts the trachea, or œsophagus, or both.

(The writer of this review cannot agree that these are cases of primary exophthalmic goitre. He has never seen compression or distortion, except in parenchymatous, adenomatous, or malignant goitre, though, of course, any one of these may develop the symptoms of exophthalmic goitre, but that would put them in the secondary class.)

A NEW OPERATION FOR PENILE HYPOSPADIAS.

(*Lancet*, September 28, 1907.)—Mr. Rupert Bucknall has described a most ingenious new method of operating on cases of penile hypospadias. The penis is drawn up over the abdomen, and the scrotum is stretched in the opposite direction. Two incisions are then made on either side of the mid-line, about a quarter of an inch apart, beginning on the glans penis, and continuing backwards along the median raphé of the scrotum. The scrotal incisions are made of such a length that the misplaced urinary meatus occupies the mid-point of these incisions. The median strip of skin, thus marked out, is to form the new urethra, the portion in front of the meatus constituting the roof, the portion behind, the floor.

Two flaps, a quarter of an inch broad, are now dissected outwards, on either side of this median strip, from the ventral surface of the penis and the front of the scrotum. The condition now shown is that of a median strip of skin, with a raw surface half an inch wide on either side of it.

The flaps are now held in the everted position with forceps, while the penis is folded down on the scrotum, the axis, upon which the penis is bent, being the original urinary meatus. It is now found that the raw surface of the penile flaps comes in contact with the raw surface of the scrotal flaps. When these have been stitched together, and union has occurred, a new urethra has been formed, the penis is now webbed to the scrotum, and there is a projecting flange on either side of the penis.

The sutures are passed in a special way. The needle first transfixes the free edge of the flange, and is then reversed and passed through the flaps, forming the flange, in the opposite direction, quite close to the attached borders of the flaps composing it. Care is taken that the needle, almost, but not quite, takes up the edges of the strips of attached skin, which will form the floor and roof of the new urethra, for it is important to approximate the epithelial margins, without the suture projecting into the new urethral lumen. All the sutures are passed before any of them are tied, and, previous to knotting them, a rubber catheter is passed down into the previously formed urethra in order to drain off the urine. The sutures are tied over small drainage tubes, which prevent puckering of the flaps. The catheter is removed at the end of 4 days, and the stitches, at the end of 14 days. In 3 or 4 weeks, the patient is ready for the second operation. The penis and new urethra are dissected up from the scrotum, lateral flaps, derived from the scrotum, being left on either side of the penis to close in the raw surface beneath it. Other flaps are formed on the scrotum, and, by gliding them towards the mid-line, the raw surface on the front of the scrotum is easily closed. If the lateral flanges project too freely, they can be easily trimmed off in order to improve the cosmetic result.

The chief advantages of the operation are :—(1) That the skin, utilised to form the roof and floor of the new urethra, is not dissected up, or even touched, so that there is no tendency to sloughing, as is the case when flaps are used. (2) That no sutures project into the lumen of the new urethra. (3) That the skin of the roof and floor of the new urethra is respectively in continuity with the roof and floor of the previously existing one. There is, in consequence, no tendency to the formation of a fistula, or subsequent stricture at the site of the false meatus, as so frequently happens when other methods are employed. The disadvantage that hairs may subsequently grow in the urethra is slight, for the hairs on the raphé are few in number, and hence it is unlikely that trouble from the deposition of phosphates on the hairs will appear in the absence of alkaline decomposition in the urine. In these cases, there is no incontinence, and there is, therefore, no reason why alkaline decomposition should occur.

Mr. Bucknall gives details of the three cases, on which he has operated by this method, within the last five years, each of which has been a brilliant success.

IRRIGATION AND DRAINAGE OF THE SEMINAL VESICLE THROUGH THE VAS DEFERENS.

(*St. Louis Medical Review*, February 2.)—Professor W. Belfield describes a novel method of treating gonorrhœal infection of the seminal vesicle. The vas deferens is brought near the skin of the scrotum, and held there by a curved needle passed under it. Under local anæsthesia, a half inch incision is made to expose the vas deferens, and its canal is then opened by a longitudinal or transverse incision. The blunted needle of a hypodermic syringe is then inserted, and the required solution is injected. The fluid traverses the vas and ampulla, and distends the seminal vesicle. If necessary, the opening in the vas may be stitched to the skin, and a fistula established for as long as desired.

Irrigation and drainage of the seminal vesicle are recommended in the following conditions:—(1) chronic gonorrhœal infection of the seminal vesicle, with or without gleet; (2) chronic suppuration of the seminal canal in the middle-aged and elderly (usually mistaken for enlarged prostate); (3) recurrent epididymitis, which results from repeated invasion of the epididymis by an infection persistent in the seminal vesicle and deep urethra; and (4) acute inflammation of the seminal vesicle from gonorrhœa and other infections.

The first injection should not exceed 30 minims, but, as the inflammation subsides, the quantity may be gradually increased.

LIGATION OF THE RENAL VESSELS FOR THE CURE OF PERSISTENT URINARY RENAL FISTULA.

Major M. P. Holt, R.A.M.C., read a paper before the Royal Medical and Chirurgical Society, on May 28, 1907, on Ligation of the Renal Vessels, for the Cure of Persistent Urinary Renal Fistula.

He said that there were certain conditions of a patient, with persistent urinary renal sinus, when nephrectomy, in the absence of the usual contra-indications, was legitimate; but it was recognised by all authorities that, in such patients, nephrectomy, by reason of extensive matting of the kidney to certain surrounding structures, might be quite impossible, or extremely hazardous, then the fistula must remain, and the patient might have the prospect of accelerated death, or at best, a miserable existence.

Just 4 years ago, a case of this kind came under Major Holt's care. Six months before, the patient had ruptured his kidney, and most extensive suppuration had followed. During the next 2 years, 4 separate attempts were made to perform nephrectomy, but the difficulties were extreme, and, on each occasion, the operation had to be abandoned owing to furious hæmorrhage, so excessive that further attempts were considered unjustifiable.

Then it occurred to Major Holt that, assuming that the secretion of urine into the abscess was the sole hindrance to healing, if permanent cessation of urine secretion on that side could be obtained by ligature of all the renal vessels, then the abscess should rapidly and completely heal.

This was accordingly done by the transperitoneal route just 2 years and 9 months after the original injury. The operation was a complete success. Within 5 days, urine ceased to be present in the discharge, and, on the 57th day, the sinus was entirely healed. Two years have elapsed, during which time the patient has remained quite well.

MODERN SURGERY OF THE KIDNEY.

Kümmell (*Surgery, Gynæcology, and Obstetrics*, Jan. 1907), in a paper on the modern surgery of the kidney, advocates that a successful practice is only to be obtained by the use of the X-rays, the cystoscope, the ureteral catheter, and cryoscopy. Since the adoption of these methods of diagnosis, out of 148 nephrectomies, there was not a single death from absence, or insufficiency of the other organ.

In regard to the X-rays, he holds that every stone in the kidney is shown, if several pictures are taken by a properly skilled radiographer, and if the plates are examined in a dark room with a proper illumination behind then.

In regard to ureteral catheterisation, he feels that no one, who has mastered its technique, will oppose it, nor has he seen any bad results from its application. This may be true, but the number of general surgeons, who have the opportunity of mastering this manœuvre, must be necessarily limited. He thinks the segregator should only be used, when it is impossible to catheterise the ureters. Though he looks upon it as a last, and less satisfactory resource, and, though it is admittedly open to occasional error, most people will be content to rely on this method of obtaining a separate sample of the urine from each kidney. Cystoscopy is of great use in determining the character of the fluid issuing from each ureter, and various pathological changes about the ureteric orifice may be characteristic, for instance, in tuberculous disease of the kidney.

The determination of the renal function, a matter of vital importance to the surgeon proposing operation on one or both kidneys, is held by Kümmell to be best determined by cryoscopy. This method is based upon the fact that the osmotic function of the kidney is diminished by disease of that organ. It has been demonstrated that there is an increased concentration of the blood if there is kidney disease, and that, with the increase of the osmotic concentration of the blood, there is a corresponding decrease in the osmotic pressure of the urine. While the kidney function is normal, all nitrogen containing molecules will be excreted by the kidney, while, if there is a disturbed kidney function, a retention of nitrogenous compounds in the blood will occur.

The osmotic concentration is determined by the lowering of the freezing point. Exact methods for determining this are given, but there is not space enough here to quote them. In 1,200 cases examined, it is noted that, with undisturbed renal function, the molecular concentration of the blood is ever constant. In all cases of extensive bilateral disease of the kidney, the freezing point of the blood is lowered below 0·58° C.; the majority of the figures vary between 0·60° and 0·65°. Coincident with this, it was usually possible to demonstrate a decrease in molecular concentration of the urine; the figures varying from 0·9 to 0·3 and 0·2.

Kümmell holds that a blood-freezing point of 0·6° marks the limit beyond which it is extremely hazardous and inadvisable to remove a kidney, and cites several cases apparently proving this proposition. The nephrectomies shown to have a normal freezing point before operation invariably demonstrated post-operatively that the kidney, which was left, was functionally adequate.

In differential diagnosis, he regards cryoscopic examination as of great importance, particularly in determining between stone in the kidney and hæmorrhagic nephritis with unilateral pain. One is glad to note that Kümmell does not admit the possibility of "reflex" anuria, as he holds that, when this occurs, there is always bilateral disease.

LOCAL ANÆSTHESIA IN SOME RECTAL OPERATIONS.

Louis J. Hirschman, in a paper in the *Detroit Medical Journal*, July 1907, gives an account of the treatment by operation, under local anæsthesia, of such conditions as hæmorrhoids, fissure, fistula, ischio-rectal abscess, low stricture, dilatation of the sphincter, etc. It must be borne in mind that, while local anæsthesia has opened a new era in rectal and other surgery, it must not be, by any means, considered as a substitute for the general anæsthetic, but in those cases, to which it is applicable, and to those patients who, on account of their fear of general anæsthesia, would suffer untold misery rather than submit to surgical treatment, it has been a distinct blessing and a godsend. The patient, who has been previously prepared by a purgative and an enema, is placed in the Sims position. A large glass hypodermic syringe is filled with the solution of choice; which may be cocaine, eucaine, alypin, chloretone, or simple sterilised water, as the case may demand.

After sterilising the parts, a point, one half-inch below and posterior to the posterior commissure of the anus, is selected. A spray of ethyl chloride is used to deaden the pain of the introduction of the needle. With one index finger in the anus, hooking down towards the sphincter, the needle, in the other hand, is passed inward, upward, and laterally in a V-shaped direction for about three-fourths of an inch, going down into the sphincter muscle, but not through it. From ten drops to a dram of the solution is slowly injected, and the needle is retracted to the point of puncture but not withdrawn, then it is pushed up on the other side in the same manner, keeping about one half-inch away from the anal aperture. After three or four minutes, the sphincter can be dilated painlessly, and the operation proceeded with.

The hæmorrhoids or polypi are then injected, the particular point to remember being that distension must be carried until the tissues are blanched. These may then be removed in turn by excision, ligation, or clamp, according to the choice of the operator.

T. Chittenden Hill, in the *Boston Medical and Surgical Journal* of April 11th, 1907, has an interesting paper on the same subject, with an account of five cases treated in this way, and with most successful results.

In the same journal, Charles S. Gilman reports 39 cases, in which internal hæmorrhoids were removed under local anæsthesia, eucaine for dilatation of the sphincter, and sterile water to anæsthetise the piles.

Since reading these papers, I have met with one case of fissure of the anus, who was suffering considerable pain, but who absolutely refused to submit to any general anæsthetic. I was able to anæsthetise, dilate, and divide her sphincter without any pain, and the results were excellent.

SUCCESSFUL ANTERIOR THORACO-BRONCHOTOMY FOR A FOREIGN BODY IMPACTED IN THE BRONCHUS.

(By F. A. Goeltz, *Annals of Surgery*, 1907.)—A boy, aged 6 years and 9 months, inspired a metal collar button which he had in his mouth. This was accompanied by an attack of coughing. During the night, he had alarming attacks of coughing, associated with cyanosis and dyspnœa. Next morning, examination showed limited movement on the right side, with absence of the respiratory murmur. Examination of the pharynx and larynx was negative, and fluoroscopic examination of the thorax was also negative.

Operation.—Through a low tracheotomy wound, the foreign body could be felt in the right primary bronchus by means of a long probe. Attempts were made to dislodge the obstruction, but failed. A curved incision was made, beginning over the second rib just beneath the middle of the clavicle, and carried downwards and inwards to within one inch of the right margin of the sternum, thence outwards to the level of the fifth rib, one inch to the inner side of the nipple. The cartilages of the third and fourth ribs were cut about half an inch from their sternal attachments, and an osteoplastic flap made by breaking the third and fourth ribs. The lung was found partly collapsed, and the button could be palpated through it. An incision, half an inch long, was made through the lung into the bronchus, and, with forceps introduced through this, the button was grasped and removed. Little or no hæmorrhage occurred from the lung and bronchus. No sutures were applied, and no drainage was used. The thoracic wall flap was replaced, silkworm-gut sutures being inserted through the muscles.

Beyond some emphysema, the progress was uneventful. Eighteen months after, the expansion of the chest was equal and good, and the respiratory sounds were normal.

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A REVIEW OF RECENT WORK IN ABDOMINAL SURGERY.

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STOMACH SURGERY.

IN an address on "The Present Clinical Aspects of Stomach Surgery" (*Interstate Med. Journ.*, 1907, XIV., 979), Ochsner says that the frequent difference of opinion between the supporters of medical and surgical treatment of gastric diseases is due to the fact that patients, who have failed to obtain relief, or who have relapsed after long continued medical treatment, eventually come to the surgeon, who is thus led to form an erroneous idea of the limitations of internal medicine.

On the other hand, those patients, who have either been unimproved, or even made worse, by operation, will most naturally leave the surgeon and seek further advice from the physician.

The brilliant results of stomach surgery, in the majority of instances, do not come under the physician's observation, for the number of cases referred to the surgeon, by any individual physician, is comparatively small, and the latter, forming his judgment from the bad results of operation which have come under his notice, is apt not only to prolong medical treatment uselessly, but in some cases to defer surgical advice until it comes too late to cure the patient.

In order to overcome these differences, Ochsner suggests that surgeons would do well do observe the progress of patients, in the medical wards, suffering from acute gastric disturbances, including ulcers in their early stages, before marked induration has taken place, so that he may appreciate what can be done in such cases by dietetic, hygienic, and medicinal treatment. Physicians, on the other hand, should make a regular practice of witnessing operations upon the stomach. They will thus become as thoroughly convinced of the value of stomach surgery as they are now concerning the surgical treatment of appendicitis, gall-stones, and renal calculi.

At the present time surgery of the stomach is limited in its results to three or four conditions:—

(1) The closure of perforation due to ulcer or injury;

(2) The establishment of drainage in obstruction of the pylorus due to neoplasms, cicatricial contraction, the presence of indurated ulcer, or hour-glass stomach in the adult, and the presence of congenital stenosis in children;

(3) The removal of neoplasms; and possibly,

(4) The correction of gastroptosis.

The author points out that, even after the most satisfactory operation for the relief of gastric diseases, it is reasonable to expect the stomach to be somewhat less perfect in a mechanical or anatomical way than the normal stomach. It is for this reason that the stomach should never be interfered with surgically, if it is possible to restore it to even an approximately normal condition by dietetic or medicinal treatment.

More real benefit is done the patient by relieving pyloric obstruction than by accomplishing all other surgical results in stomach surgery. Whatever the cause of the obstruction may be when the patient comes under the surgeon's care, in a vast majority of cases, the primary cause was an ulcer in that portion of the stomach which is most exposed to trauma because of its special function.

A report of the surgery of benign diseases of the stomach from Helferich's clinic is furnished by Graf (*Deut. Zeitschr. f. Chir.*, 1907, XC., 365). He divides the cases into two main groups; all the affections without open ulcer—cicatricial stenoses, atony, ptosis—are classed together. Among these there was no mortality. In the second group, are the cases of open pyloric ulcer, or non-stenosing ulcer of the body of the stomach; among these there was a slight mortality.

In the whole series of cases, there is an operative mortality of between 4 and 5 per cent.

Good permanent results were obtained in four-fifths of the cases with simple motor derangements without cicatricial stenosis (ptosis, atony); in three-fourths of the cases with cicatricial stenosis of the pylorus. Pyloric ulcers were healed in two-thirds of the cases; and non-stenosing ulcers in one-half.

The later bad results were due to:—

(1) Non-healing ulcer (pain, hæmatemesis, perforation);

(2) Subsequent contraction of the stoma;

(3) Rarely, perigastric adhesions;

(4) A combination of stomach symptoms with general diseases.

The usual results of gastro-enterostomy are:—

(1) An improvement in the motor function up to the normal;

(2) Lowered gastric acidity;

(3) A reduction of the dilatation, though only in a minority to the normal size.

Among the other operations, jejunostomy is chiefly limited to the treatment of hæmorrhage; resection of the ulcer is not yet worth employing as a normal procedure on account of its large mortality. It is indicated when malignancy is suspected; relatively indicated (as excision) in many cases of bleeding ulcer and perforation.

For ptosis and atony of the stomach, gastro-enterostomy is preferable to gastropexy or gastroplication alone.

Speaking of the indications for operation, he says that a waiting policy offers no direct danger to the life of the patient in cases of absolute or relative stenosis of the pylorus; yet treatment by lavage for months or years is an unnecessary infliction on the patient, and is not justified by the good prognosis afforded by gastro-enterostomy in such cases. In non-stenosing ulcer of the body of the stomach, to wait is dangerous on account of the likelihood of bleeding or perforation.

Munro reviews the final results of operation in 150 cases of benign stomach lesions. (*Ann. of Surg.*, 1907, XLV., 818.)

Eighty-seven of these cases showed gross ulcers in the stomach or duodenum. This class gave the most satisfactory results, though among them there were a few definite failures, two of these being duodenal ulcers in which severe hæmorrhage occurred a year after gastro-enterostomy.

The so-called medical ulcers were so unsatisfactory that Munro has now learnt to close the abdomen when there is no positive evidence of stomach lesion; if there is functional interference from ptosis or minor adhesions, it may be wise to do a gastro-enterostomy, but the brilliant results following this operation in the presence of stenosis, or crippling ulcer, must not be expected.

Of the 25 cases of adhesions without evidence of active ulceration, all but 6 gave excellent results.

The worst subjects for interference were those classed as neurotics. Most of them were made worse by operation.

During the evolution of the operation the various methods have been tried; the best results are now obtained with Mayo's antiperistaltic anastomosis. Though the end results of Finney's operation were good, the immediate results were more slowly manifested.

According to Nyrop (*Gastropexie und Retention Ann. Internat. de Chir. Gastro-Intest.*, 1907, I., 188), gastroptosis may be classified as follows:—

(1) Gastroptosis with retention:—
  (*a*) Retention due to the ptosis (kinking of pylorus).
  (*b*) Retention due to stricture (cicatricial, etc.).
(2) Gastroptosis without retention:—
  (*a*) Without symptoms,
  (*b*) With symptoms due to:—
    1. Nervous conditions.
    2. The gastroptosis itself.

Gastropexy is not justifiable when the symptoms are purely nervous. When gastroptosis is associated with retention, the latter may be relieved by gastro-enterostomy, the ptosis persisting without causing trouble.

The partisans of gastropexy do not sufficiently consider the interference with the motor functions of the stomach, especially when its musculature is already feeble.

Nyrop concludes that the facts are in direct contradiction to Rovsing's statement "that the objections to gastropexy—a hindrance to the physical action of the stomach—are purely theoretical."

A successful case of complete gastrectomy for a diffuse atrophic carcinoma of the stomach is recorded by Moynihan. (*Lancet*, December 21, 1907.) The operation was commenced in the usual way by clamping the coronary artery, dividing the gastro-hepatic omentum, and securing the pyloric artery. The duodenum was then clamped and divided, and after ligation of the gastro-duodenal artery and division of the gastro-colic omentum, the whole stomach was turned over to the left.

The difficulty of attaching the jejunum to the œsophagus was overcome in the following manner; a loop of jejunum was drawn up through an opening in the transverse meso-colon, and laid along a line immediately behind the œsophagus. Eight interrupted "anchor" sutures were inserted between the jejunum and posterior surface of the œsophagus; in front of these a continuous sero-muscular suture was introduced from left to right, uniting the jejunum to the posterior surface of the œsophagus.

In front of this suture line, small openings were made in the jejunum and œsophagus at the left end of their posterior attachment, the posterior margins of these openings were then united by a continuous through and through stitch, the incisions were then enlarged towards the right by successive small cuts, each one being closely followed by the suture until the posterior half of the circumference of the œsophagus had been divided. The anterior wall of the œsophagus was now gradually severed until it was completely cut across, the suture, now changed to the Connell type, being continued so as to join the freshly cut edge of the œsophagus to the anterior margin of the opening already made in the jejunum.

This stage of the operation was greatly facilitated by downward traction upon the stomach, which was allowed to retain its connection with the œsophagus until the suturing was practically complete. The patient made an uninterrupted recovery.

GASTRO-ENTEROSTOMY.

A. *Technical.*—The "no-loop" operation with the jejunum directed to the left described by W. J. Mayo, in 1906, has been adopted by many surgeons both in this country and abroad; others, however, are doubful whether this is the normal position of the jejunum. According to Mayo (*Ann. of Surg.*, 1908, XLVII., 1), this misconception as to the anatomical relationship of the jejunum comes from the variation in degree with which the peritoneal suspensory ligament extends downwards from the transverse meso-colon upon the jejunum.

This ligament may reach so far down upon the coil as to reach the jejunum after it has turned to the right, thus the jejunum will appear to turn to the right at its origin, and any anastomosis made here will be a loop operation.

B. *Physiological Considerations.*—The functions of the stoma after gastro-enterostomy were investigated by Leggett and Maury (*Ann. of Surg.*, 1907, XLVI., 549) by feeding dogs after the operation with pieces of meat attached to a string, and by studying the condition of the lacteals after feeding with fat.

The first method showed that the meat passed sometimes through the stoma, and sometimes through the pylorus. In one case, it passed through the stoma then back through the duodenum and pylorus into the stomach twice over.

In an animal fed with fat after a gastro-ileostomy had been made, it was found that only the lacteals of the jejunum were filled, showing that the fat had not passed through the stoma.

As Guibe says (*La Presse Médicale,* No. 103, Dec. 21, 1907), there can be no doubt that, when the pylorus is impermeable, the food must pass out through the stoma, but when the pylorus is open there is no very good reason why the food should leave the stomach by other than the normal route.

To explain this it must be remembered that gastro-enterostomy is not a drainage operation. There are three factors which may be concerned in emptying the stomach: gravity, respiratory movements, and contractions of the organ itself. Now the stomach is supported in the abdominal cavity by viscera whose specific gravity is approximately that of water. Supposing for a moment that the stomach is an inert sac; its contents will have no tendency to run out of the opening, but, if the intestine has not lost its contractility, there will be an irruption into the stomach of the contents of the intestine. Therefore, gravity is of itself incapable of emptying the stomach.

The respiratory movements alone will not serve to pass the food from the stomach into the intestines, for they cause an alternate raising and lowering of intra-abdominal pressure which affects stomach and intestines alike.

Thus we are left with the contractions of the stomach itself as the only means whereby the organ may empty itself. These peristaltic waves become more and more powerful as they approach the pylorus, so that the pressure here is always greater than in the rest of the stomach. Under the influence of these peristaltic contractions, the food is passed in the direction of the pylorus which now comes to be the lowest point of the stomach, while the stoma is no longer at the most dependent point. (This fact would appear to be immaterial if gravity plays no part.) Moreover, the stoma is placed on the side of the stomach, and it is well known that lateral openings are not as good as openings in the axis of evacuation of a viscus. For example, an iliac anus, unless there is a well-marked spur, will fulfil its new functions imperfectly, allowing the fæces to pass onwards into the distal segment.

Guibe quotes Kelling's experiments on dogs showing that liquids still pass out through a permeable pylorus after gastro-enterostomy.

Cameron (*B.M.J.*, January 8, 1908) considers that the result in Leggett and Maury's experiment, where the meat passed out by the stoma, is to be explained by the fact that the solid lump of meat together with a bullet caused a reflex closure of the pylorus. He thinks that, when the pylorus is unobstructed, it is improbable that the food deviates from the normal course. In support of this he quotes a case of duodenal fistula, which refused to close in spite of the performance of gastro-enterostomy, though it healed at once after the pylorus had been ligatured.

This happened in Berg's second case (*Ann. of Surg.*, 1907, XLV., 721) in which the duodenal fistula continued to leak after gastro-enterostomy had been performed, and refused to close until the pylorus was occluded.

It is natural to suppose that this preference of the food to leave the stomach by the normal exit rather than through the artificial opening would be followed by subsequent closure of the latter, when the pylorus is unobstructed, and many such cases are on record. Tuffier, however, recounts a case (*Rev. de Chir.*, 1907, XXVII., 1092) in which, even in the presence of cicatricial contraction of the pylorus, the stoma of a posterior gastro-enterostomy became closed. He thinks that this may be the explanation of a certain number of recurrences of ulceration after gastro-enterostomy.

The beneficial effects of gastro-enterostomy upon ulcers of the stomach are due, according to Paterson (*Lancet*, September 12, 1907), to the diminution of the total gastric acidity. This is not entirely dependent on the neutralisation of the gastric secretion by the regurgitated bile and pancreatic juice, but is probably due also to the early escape of the acid gastric chyme, which, as soon as it arrives in the jejunum, stimulates the pancreas, and the presence of pancreatic juice in the intestine then leads to an inhibition of further secretion of gastric juice.

He considers that the benefits of the operation are due as much to lessened acidity as to "drainage," though this will obviously depend to a certain extent upon the nature of the case. Paterson says that evacuation of the stomach is hastened by gastro-enterostomy in cases having a previous pyloric obstruction, while there is practically no alteration in cases where evacuation was normal before operation.

(From this it would appear that the latter class of cases would gain little advantage from the operation, for in them drainage is not to be considered, and, as evacuation of the stomach is not hastened, an early inhibition of the gastric secretion would not be expected, and neutralisation of the acid chyme could only be effected by regurgitation of the alkaline duodenal contents, which Paterson thinks only occurs to a slight extent.)

Cameron (*loc. cit.*) attributes the utility of gastro-enterostomy in peptic ulcer to the regurgitation of alkaline duodenal juices through the stoma. He suggests that, in cases of ulcer, the operation should be made with the object of ensuring a free regurgitation; that is, a no-loop operation near the cardia, or even with division of the intestine on the proximal side of the stoma, so as ensure the duodenum emptying itself into the stomach through the pylorus. He would condemn entero-enterostomy and Y operations.

Gray (*Lancet*, February 22, 1908) thinks that the diminished acidity after operation is due to the fact that the gastric contents pass out of the stomach before reaching its pyloric portion, where the hormone controlling the secretion of hydrochloric acid is liberated. He suggests that peptic ulcer of the jejunum may be the result of making the stoma in the acid-secreting cardiac pouch of the stomach. (In this case it must be assumed that some of the food passes into the pyloric portion, without going through the stoma, in order to stimulate the secretion of acid.)

Three cases of persistent uncomplicated hyperacidity, cured by gastro-enterostomy, are reported by Balas (*Deut. Med. Woch.*, 1908, XXXIV., No. 1). He confirms Katzenstein's assertions of regurgitation of bile and pancreatic juice into the stomach, which neutralise acidity as well as producing a reflex reduction in the secretion of gastric juice.

An interesting example of a gastric ulcer healing completely after gastro-enterostomy was reported by Sherren before the Clinical Society (*Lancet*, May 18, 1907). It is worthy of note that, in this case, both stoma and pylorus were found patent at the necropsy 22 months after operation. The stomach, examined microscopically, showed that the ulcer had healed completely.

Although the advocates of pyloroplasty and gastro-duodenostomy have always argued that these operations approach nearer the anatomical and physiological ideal than gastro-enterostomy, yet it seems that this very disturbance of the normal functions is accountable, in some degree at least, for the beneficial results of the latter operation. Nevertheless, Finney (*Amer. Journ of Med. Sci.*, 1908, CXXXV., 333) thinks that the results of gastro-duodenostomy, according to his method, in the hands of different operators will be more constant than those of gastro-enterostomy, as the technique is simpler and less complicated. Personally he prefers the operation of gastro-duodenostomy because it has given him better results than any method of gastro-jejunostomy, and he finds it easier of execution. Except for malignant disease he performs it in all cases. He believes that each surgeon should be guided in his choice of operation by his own familiarity with the particular method.

The operation suggested by Rodman, excision of the pyloric part of the stomach for ulcer, finds an advocate in Brechot, who points out the advantages of pylorectomy over gastro-enterostomy for benign stenosis of the pylorus (*Rev. de Chir.* 1907, XXVII., 112).

Brechot's arguments may be presented in the following order :—

(*a*) The importance of the duodenum in governing the digestive secretions.—The author carried out some experiments on dogs in order to confirm the observations of Starling and Bayliss on the mechanism of pancreatic secretion. He also injected a dilute solution of hydrochloric acid into different segments of the jejunum of a dog with a pancreatic fistula; and showed that its power of producing secretin rapidly diminished from above downwards. If the duodenum is short-circuited, not only will the pancreatic juice be lessened in amount, but its activity will also be diminished.

The experiments of Delezenne and Fruin upon the secretion of succus entericus, which contains the activating enterokinase, are quoted. They showed that the secretion of this juice is most abundant in the duodenum and upper jejunum, that it is called forth by the presence of acid chyme in the duodenum, and that the secretion thus obtained, when injected into the lower segments of small intestine, will cause them to secrete.

These experiments show that the secretion of succus entericus is subject to the same influences as that of the pancreatic juice. In fact the secretion of bile, pancreatic juice, and succus entericus are provoked on the same ground, by the same causes, and their variations are identical under the influence of the same experimental modifications.

(*b*) Influence of the duodenum on the functions of the pylorus.—Although the manner in which the duodenum governs the pyloric sphincter is discussed at some length, it appears scarcely to affect the question as to whether the duodenum should be short-circuited or the pylorus removed.

(*c*) The evil results of a deficiency of pancreatic juice.—The author first considers the experimental results of a deficiency of pancreatic secretion with regard to its action on fats, proteids, and carbohydrates. Identical conditions, he believes, follow as a result of gastro-enterostomy, though the gravity of the affections, for which this operation is practised, leads one to consider the results satisfactory.

There is a sufficiently large number of cases reported, of gastro-enterostomy followed by abundant diarrhœa, to which Terrier long since called attention. Two cases, seen many months after operation, presented diarrhœa with intestinal pain. These cases had steatorrhœa, the fæces of one of them containing 32 per cent. of unabsorbed fat. Kelling and Rosenheim have noted that the digestion of white of egg is impaired after gastro-enterostomy.

Brechot quotes these facts to show that intestinal digestion after gastro-enterostomy does not return to the normal, that there is a default in alimentary absorption.

This may be contrasted with the conclusions of Paterson and of Cameron (*loc. cit.*), who find no diminution in the fat absorption; and may be compared with the observation of the latter upon a patient whose pyloric sphincter had been excised, and who was found to absorb only 73 per cent. of the fat of milk.

(*d*) Motor function of stomach after gastro-enterostomy.—The author concludes that a gastro-enterostomy opening does not function, or only functions imperfectly, when the pylorus is open or only partly closed; that the duodenum governs the gastric motility as well as that of the pylorus itself, and ensures the physiological evacuation of the stomach.

A study of the motor phenomena of the stomach after gastro-enterostomy shows certain defects. The great majority of observers agree that the capacity of the stomach rarely returns to the normal. There exists a gastric stasis, and the stomach still contains an appreciable quantity of liquid an hour to an hour and a half after a meal, whereas the normal stomach should be empty at this time.

The most active portion of the stomach is the pyloric region, and the contractions converge towards the pylorus. The artificial stoma is placed in a less active part; playing, in the case of complete stenosis, the rôle of an iliac anus in complete obstruction. It allows liquids and gas to pass when introduced in sufficient quantity to force the resistance of the stomach coats. When the greater part has been evacuated, the remainder is not sufficient to vanquish the opposing resistance, the result is a stasis, more or less marked. If the stenosis disappears at some later period, the pylorus again becomes the normal route.

(*e*) The benign affections of the stomach calling for intervention.—Patients, with benign affections of the stomach, who have not benefited by medical treatment followed rigorously for five or six weeks, should come to the surgeon. The great majority of these patients have pyloric obstruction with, almost always, marked gastric dilatation, itself followed by secretory and motor troubles.

Benign stenoses of the pylorus are congenital or acquired. For the former Brechot thinks resection of the sphincter will be the best operation.

Acquired stenoses are due to extrinsic or intrinsic causes. In the former case they generally have their origin in lesions of the neighbouring organs, and are due to the resulting adhesions. The degree of the neighbouring lesions, the actual state of the pylorus, and the difficulty and danger of freeing adhesions will regulate the conduct of the surgeon. Gastro-enterostomy will often be the only possible intervention.

The class of acquired intrinsic stenoses embraces the great majority of the cases. Stenoses due to benign tumours, or to plastic linitis, localised to the pylorus, are both extremely rare.

The common causes may be classified under two headings :—

(i) Functional stenoses (including stenosis by curvature in gastroptosis and pylorospasm).

(ii) Anatomical stenoses, due to scar formation.

The cases belonging to this second group are those most commonly met with. They are most frequently consecutive to the cicatrisation of a round ulcer.

After discussing the immediate dangers of ulcer, such as perforation and hæmorrhage, and the later cicatricial contraction, the author lays stress on the fact that an ulcer in the stomach, particularly in the pyloric region, constitutes a soil all ready prepared for cancer.

(*f*) Comparison of the results of gastro-enterostomy and pylorectomy.—The author emphasises the complications of gastro-enterostomy, such as vicious circle, peptic ulcer of the jejunum, stasis, eructations, and borborygmi, and thinks that the cases, in which these symptoms do not exist, are those, more common than is thought, in which the food has returned to its normal course through the duodenum.

He concludes that gastro-enterostomy is faulty in that it does not satisfy the normal physiology of digestion, and also because it constitutes, for ulcerative pyloric stenosis only, a palliative operation, leaving the dangers which may result from the evolution of the ulcer itself.

Pylorectomy fulfils these two indications: it re-establishes the continuity of the gastro-intestinal tube with less interference with the digestive functions. (The author is referring only to pylorectomy by Kocher's, or Billroth's first method.)

It constitutes the radical treatment of ulcer, and also of the intense hyperchlorhydria, which often accompanies it, and which sometimes persists after gastro-enterostomy.

Brechot believes that pylorectomy depends for its gravity upon the condition for which it is done. In those cases, in which the pylorus can be resected easily, the immediate results are as good as those of gastro-enterostomy.

That the later results do not show any troubles like those of gastro-jejunostomy, nor the complications, often, fatal, due to the ulterior evolution of the causal lesion.

When pylorectomy is impracticable, gastro-duodenostomy should be done, for it maintains the physiological course of alimentation. Gastro-jejunostomy should be reserved for those cases, still numerous, in which these two methods cannot be practised.

Monprofit has published a report of 90 gastro-enterostomies in Y performed by him (*Ann. Internat. de Chir. Gastro-Intest.*, 1907, I., 162). All the operations, except 3, were anterior gastro-enterostomies. 52 of these operations were for malignant disease; among these there were 7 deaths.

Monprofit classifies the 38 operations for benign affections as follows:—

Ulcer	19	with	2	deaths.
Pyloric stenosis	7	„	0	„
Chronic gastritis	3	„	0	„
Dilatation	5	„	0	„
Hour-glass	1	„	0	„
Undetermined	3	„	0	„

Two of the posterior gastro-enterostomies in Y required a second anterior operation, the original anastomoses not being interfered with. In the third case, the original posterior gastro-jejunal opening had closed, so the end of the jejunum was simply implanted laterally on to the anterior surface.

The indications for the anterior operation in Y are said to be:—

(1) Impossibility or difficulty of the posterior operation on account of—
  (*a*) distension of the stomach,
  (*b*) adhesions on posterior surface,
  (*c*) invasion of posterior surface by cancer.
(2) Its greater rapidity of execution.
(3) Failure of the posterior operation.

He remarks that the method of implantation, adopted in gastro-enterostomy in Y, has obvious advantages over lateral anastomosis. The only objections to the operation (length and complexity) are overcome with practice.

SURGERY OF THE PANCREAS.

In an article, dealing with the symptoms and diagnosis of acute pancreatitis, Egdahl states (*Surg. Gyn. and Obst.*, 1907, IV.) that a previous history of cholecystitis, or some form of gastro-intestinal disorder, may be usually obtained. In other cases, the patient may have suffered from typhoid fever, gastric ulcer, or may have received an epigastric injury shortly before the onset of the attack.

The disease commences with a sudden severe abdominal pain, generally in the epigastric region. Nausea and vomiting set in almost at once, the latter soon becoming fæculent. The temperature may be only slightly raised, collapse appears early, and the abdomen soon becomes distended, most marked in the epigastrium. After two or three days, should the patient survive, a tumour may be palpable in this region. Icterus, anosis, and hiccough may be present.

Pancreatic catarrh and interstitial pancreatitis, in their relation to catarrhal jaundice, form the subject of a recent paper by Mayo Robson (*Surg. Gyn. and Obstet.*, 1908, VI., 29).

His object is to adduce arguments in support of the view that catarrhal jaundice is more often due to a catarrhal pancreatitis than to catarrhal cholangitis. This is not easy of proof in cases of acute catarrhal jaundice, for the opportunity of examination, at operation or post-mortem, does not often occur. There is no such difficulty in demonstrating the cause in chronic catarrhal jaundice, a disease characterised by jaun-

The results of palliative operations, such as cholecystostomy, cholecyst-gastrostomy, or enterostomy give little encouragement.

According to Sauve (*Rev. de Chir*, 1908, XXVIII., Nos. 2 and 3), pancreatectomy should be limited to ablation of the head. He considers that duodenopancreatectomy answers all requirements, even for cancer of the head of the pancreas, and it has been successfully performed by several surgeons.

The operative technique of pancreatectomy has been worked out upon the cadaver by Desjardins (*Rev. de Chir.*, 1907, XXVII., 945). He says that, hitherto, the pancreas has been regarded with some reserve by surgeons; and this for several reasons. First there is the deep situation of the gland. Nowadays it should not be considered so inaccessible, thanks to the advantages of Robson's or Kehr's incisions, and the use of the pillow as for gall-duct operations. Another reason for respecting the pancreas depends on the number and importance of its vascular connections. Other reasons against the operation were the accidents following pancreatectomy, and the length of time required to re-establish the continuity of the biliary and intestinal tracts.

Desjardins has collected 30 cases of pancreatectomy from the literature; there were 16 recoveries and 14 deaths. Two of the cases were total pancreatectomies, both recovered. The remainder were partial pancreatectomies; resection of the tail, 7 recoveries and 3 deaths; partial of the head, 7 recoveries and 9 deaths; total extirpation of the head, 2 fatal cases.

He does not think that total pancreatectomy is justified by physiology, in spite of the two successful cases.

With regard to partial pancreatectomy, it is first necessary to decide whether the duodenum should also be resected.

Codivilla is the only surgeon, who, operating on the pancreas, has performed a duodenectomy. Desjardins believes that the principal danger of pancreatectomy is gangrene of the duodenum. He points out that the whole duodenum is irrigated by the same vessels which supply the pancreas, it would therefore be astonishing if gangrene of the duodenum did not follow section of the pancreatic arteries.

From these considerations, it is evident that the duodenum must be resected, if the head of the pancreas is to be completely removed. There are three dangerous zones to be considered in removing the duodenum: first, there is the ascending colon which, in certain cases, rests upon the right side of the duodenum without the interposition of the peritoneum. He advises Berg's method of avoiding injury to the colon in this situation. The second danger zone is at the level of the third part of the duodenum, at the point where the superior mesenteric vessels emerge from beneath the pancreas. It is also necessary to remember the proximity of the middle colic artery, which may be easily injured, leading to gangrene of the transverse colon. The third danger zone is behind in the neighbourhood of the portal vein and vena cava. Injury to these vessels may be avoided by practising "decollement" of the duodenum.

This liberation of the parts to be removed is the key to the operation, it should be carried to the left of the mid-line, if possible, passing to the left of the vena cava, and mobilising the whole portion of the pancreas to be resected.

The stage of decollement being completed, ablation may be proceeded with. The common bile duct is divided as low down as possible, the pancreas is sectioned between two clamps at the level of the body, and the duodenum is divided near the pylorus and again close to the duodeno-jejunal junction.

The next stage is that of reparation. It is necessary to re-establish, (1) the continuity of the intestine; (2) the continuity of the biliary tract; (3) the excretory duct of the pancreas. The first of these is done by implanting the upper cut end of the jejunum into the stomach, after closing the pylorus. The second may be accomplished in two ways. If the common duct is dilated and of sufficient length, it may be implanted into the jejunum. If these conditions are not favourable, the choledochus may be resected up to the cystic duct, and the gall-bladder anastomosed with either the jejunum or the stomach. With regard to the third point there are two possibilities, the establishment of an external pancreatic fistula, or the anastomosis of the pancreas with the intestine. The second of these, is the method of choice, and here two cases may present themselves. Where the duct of Wirsung is very dilated, it may be implanted into the jejunum, making a pancreatico-jejunal anastomosis. In the second case, when Wirsung's duct is not sufficiently dilated to allow of anastomosis, Desjardins suggests the following manœuvre. The jejunum is cut across about 30 cm. below its upper end, but allowed to retain its connection with its mesentery. The end of the jejunum below the isolated segment is now implanted into the stomach. One end of the isolated segment is attached to the gall-bladder, the other end being sutured over the stump of the pancreas. Finally, the middle of this length of intestine is joined to that part of the jejunum below the gastro-enterostomy. The bile and pancreatic juice can now only escape through this new common passage-way formed from the isolated portion of jejunum.

IDIOPATHIC DILATATION OF THE COLON.

An example of idiopathic dilatation of the colon, or—as it is called in Germany—Hirschsprung's disease, is recorded by Wagner (*Surg. Gyn. and Obst.*, 1908, VI., 44). In this case the infant had suffered from obstinate constipation throughout the two years of its existence. When the bowels were opened, the amount passed was disproportionately small and often offensive in odour. The child was emaciated, with an unduly large abdomen. A most striking feature was the visible peristalsis, "it consisted in a heaving of the abdominal wall as though an arm was moving to and fro inside the abdomen trying to burst through the wall, raising it 6 to 8 inches in height." It was this forceful peristalsis of the dilated colon which led to a correct diagnosis.

When the abdomen was opened, a greatly dilated loop of the sigmoid at once presented in the wound, resembling an enormous hypertrophied adult stomach.

Though the sigmoid was chiefly affected, yet as the ascending, transverse, and descending colon were all dilated, it was decided to remove the whole large intestine. This was done, and an end to side anastomosis performed between the ileum and rectum. Death occurred from embolism 32 hours later in spite of the fact that everything appeared to be doing well.

Skelding (*Brit. Journ. of Childr. Dis.*, 1907, IV. No. 12) also reports a case of congenital dilatation of the colon. In this case the transverse colon appeared chiefly affected, the distension ceased at the splenic flexure, and the descending colon and sigmoid were collapsed and empty.

The transverse colon was manipulated, emptied of gas, and pushed well up, and the abdomen was closed. After the operation the child steadily improved.

During the past year, several articles dealing with this condition have appeared, and in these are set forth the various operative procedures which have been adopted for its relief, ranging between the two extremes exemplified in Wagner's and Skelding's cases.

Löwenstein (*Centralbl. f. allg. Path.*, 1907, XVIII., 929), whose article is based on a study of 120 recorded cases, gives the following picture of the disease :—

Children or adults are affected with long-standing constipation; the abdomen becomes swollen, often to an unusual degree, flatus and stools pass only in small quantities. These may be for some time the only symptoms.

Later on there comes difficulty in respiration owing to the elevated position of the diaphragm; then pain in the abdomen. In spite of this, nutrition remains good. Through the tightly stretched skin of the abdomen, with its distended veins, may be seen or felt the thickened coils of intestine in active peristalsis. The percussion note is tympanitic all over, though here and there patches of dulness may be caused by masses of fæces. In the rectum are hard balls of fæces, on the removal of which stinking gas escapes. It is to be noted that Wagner also calls attention to the offensive character of the bowel contents, while Hawkins (*B.M.J.*, March 2, 1907) remarks on the frequent absence of any fæcal odour.

According to Löwenstein, the prognosis is not particularly good; after a transient improvement a relapse often sets in, the constipation now alternates with profuse diarrhœa, and the patient sinks with the appearance of ileus, or perforative peritonitis. At the autopsy neither from without, nor on cutting open the bowel, is any mechanical obstruction to be found, and this is characteristic of the disease.

In 83 cases where the point is noted the dilatation affected :—

Several sections of large gut	in	35
Sigmoid flexure alone	„	27
The whole large gut	„	11
Large gut and rectum	„	6
Small gut as well as large	„	4

In the majority of cases the large gut is also lengthened, especially the sigmoid, but the disease may appear in intestines of normal length.

The hypertrophy is greatest where there is most obstruction, sometimes by valve-formation or opposite the rectum. Rarely the wall of the dilated gut is not thickened, it may even be thinned. Nevertheless these cases should be classed in this disease, as the thinning is relative or secondary.

The abnormally long mesentery, so often met with, is no longer able to support the heavy intestine, which sinks towards the pelvis, and thus produces kinking at the junction of sigmoid and rectum. This kinking is probably always secondary, though looked upon by some as the cause of the disease.

The kinking may be absent, while in other cases it may be so extreme, and the loop of the flexure so great, that volvulus is produced.

The author goes fully into the pathological anatomy of the disease, and also discusses the symptoms in some detail. He attaches some diagnostic value to the absence of ascites, which affords a means of distinguishing this condition from tuberculous peritonitis.

Hirschsprung originally described this affection as a "morbus sui generis," depending upon either a fœtal morbid process, or an anomaly of development. He now holds that, in certain cases, the disease is due to abnormal length and looping of the intestine with resulting constipation. Other theories are: that the disease is due to congenital dilatation with secondary hypertrophy; primary paralysis of a portion of the intestine; aplasia of muscle below the dilatation; faults of the nervous system, especially the sympathetic. (In this connection, the histological findings are up to the present scanty and uncertain, and against this view Löwenstein brings the active peristalsis so often seen.)

The author gives Concetti's division of the cases into three groups:—

(1) Makrocolic, a simple abnormal length of the large intestine. Prognosis good.

(2) Megacolic, a general increase in the internal diameter and thickening of the walls, true Hirschsprung's disease.

(3) Ektacolic, congenital ectasia of a longer or shorter segment of the colon.

The author concludes that two forms may be distinguished:

(1) True congenital idiopathic megacolon, or Hirschsprung's disease. A congenital dilatation and hypertrophy of the whole or part of the large intestine. The disease is very unusual, it begins commonly at birth, and the prognosis is poor.

(2) Pseudo-megacolon, the result of an abnormal length and looping of the large intestine, particularly the sigmoid. The prognosis in this form is more favourable.

The results of treatment in 105 cases were as follows:—

	Medical.	Surgical.
	60	45
Died	39 (66 per cent.)	21 (48 per cent.)
Unchanged	5	2
Improved	9	7
Cured	7 (12 per cent.)	15 (34 per cent.)

Physical methods of treatment appear indispensable.

While simple mechanical emptying of the rectum of stools has seldom much effect, it will sometimes bring relief. High enemata of warm oil, salts, or soapsuds often give an excellent result, but they must be frequently repeated.

Of the surgical operations which may be practised, resection of the affected part of the bowel stands first according to the published results. Entero-anastomosis without resection is often successful. Colopexy or colostomy may lead to a cure, or at least to improvement. The older the child the better is the prognosis.

Hawkins (*loc. cit.*) reports three cases occurring in children, and four in adults. He sees no reason for separating the infant and adult cases ætiologically; the cause in all cases being a congenital nervous defect. This inert segment of intestine acts as a physiological obstruction, while the intestine behind it becomes dilated and hypertrophied.

He suggests the name of "Neuropathic dilatation and hypertrophy."

The nervous element in the causation is generally paralytic, but may be spastic.

He urges the importance of early diagnosis, because in every case there is a period when surgical treatment can effect a cure. Among the 7 cases reported, 3 died without operation.

Colotomy was performed in one case and colostomy in another, both were followed by death. Entero-anastomosis and exclusion of the affected segment of gut led to a cure in 2 cases, though in one of these the excluded loop was subsequently resected, owing to volvulus formation. Hawkins summarises the treatment by saying that colostomy is useless, excision unjustifiable, and that the best treatment is anastomosis of the iliac and pelvic colon, with fixation of the excluded loop.

The case reported by Fletcher and Robinson (*B.M.J.*, Feb. 16, 1907) was relieved by simple emptying of the gut, the contents being squeezed out through the anus, which was dilated by an assistant. After the operation, the boy appeared to be in good health for eight months; he then died with symptoms of toxic enteritis. At the autopsy it was found that considerable diminution in the calibre of the intestine had taken place, though the colon was still greatly dilated and hypertrophied.

The authors agree in dividing these cases into two groups: those in which there is some mechanical obstruction, and those of congenital origin. It is in the latter class that their case should be placed.

The operative treatment of Hirschsprung's disease is considered by Ito and Soyesima (*Deut. Zeit. f. Chir.*, 1907, Bd. 90, 459), who also report a case of their own. They give the following hypotheses, which have been advanced concerning the pathogenesis of the disease :—

1. Congenital dilatation and hypertrophy of the colon.
2. Congenital increased length and loop-formation of the sigmoid flexure, with or without secondary kinking, volvulus formation, &c.
3. Abnormally long mesentery and secondary twisting of the sigmoid.
4. Congenital hypo, or aplasia of the muscularis of the last sections of the large gut, with secondary dilatation.
5. A weakened tonus of the musculature following a defective innervation of the large bowel.
6. Spastic contraction of the colon or sphincter ani.
7. Primary inflammatory changes in the mucosa of the large intestine.
8. Congenital narrowing of the large intestine.

When operating upon their case, they found the flexure not long and looped, but dilated and thickened, and they came to the conclusion, regarding the pathogenesis, that it was "a kind of gigantism of the colon." This view is also held by Tuffier (*Bull. et Mem. de la Soc. de Chir. de Paris*, 1907, No. 34), who likens the condition to gigantism, as met with in other parts of the body, whose genesis is unknown.

Ito and Soyesima discuss most of the operative possibilities. Puncture of the intestine has been undertaken in 10 cases: its results are only of a temporary nature. In one case, the rectum was opened posteriorly below the coccyx, and the hand introduced in order to evacuate the fæces bimanually.

Exploratory laparotomy, 20 cases; in some of these an attempt was made to empty the intestine by squeezing its contents down towards the anus. Colotomy is only occasionally needed. Colostomy, 23 cases, may be employed for giving necessary relief, or as a preliminary to other operative procedures.

Neither coliplication nor coloplasty is likely to produce much permanent benefit.

Intestinal resection and complete ablation are the most radical methods. Twenty-one cases are recorded in this article, of these 14 gave good results; 5 did not survive the interference; in one there was no improvement; and one died some months later with diarrhœa.

In those cases, in which the obstruction is clearly due to kinking and valvular closure, the authors consider that resection is undoubtedly the best operation to employ. But where there is no mechanical obstruction, colopexy, entero-anastomosis, or intestinal exclusion should be considered.

Ito and Soyesima's case was cured by incomplete colon exclusion, after entero-anastomosis and coliplication had proved failures.

Tuffier's case (*loc. cit.*) was cured by entero-anastomosis and incomplete exclusion. He regarded colostomy as palliative, an operation of necessity only. When possible, either resection or lateral anastomosis with exclusion are the operations of choice.

A CASE WITH COMMENTS.

"PNEUMOCOCCAL PERITONITIS."

BY REGINALD F. JOWERS, F.R.C.S.,
Surgeon, Sussex County Hospital.

THE child, a healthy girl of 14, was in her usual health till May 2nd, when she complained of a sore throat. She was seen by Dr. Wells next day, May 3rd, and found to be suffering from a mild follicular tonsillitis. On May 4th, she was so much better that he did not intend to see her again for a day or two, but was hastily summoned, on May 5th, as she had been seized with violent abdominal pains and diarrhœa, with rather urgent tenesmus.

He found some abdominal tenderness, not specially localised, temperature about 100°, and pulse hurried. Hot fomentations were applied, and opium given to check the diarrhœa. During the night the pain and purging continued. A normal menstrual period had just ended.

Next morning, May 6th, she evidently had peritonitis, and I was asked to see her with a view to operation. Temperature had fallen to 95°; pulse was 120.

The patient was lying on her back, with a pinched expression, the knees drawn up, the abdomen slightly distended, immobile, rigid, and very tender. Rectal examination revealed nothing.

Immediate operation was decided upon, the diagnosis being general peritonitis, probably due to a perforated appendix.

When the abdomen was opened, a quantity of odourless pus escaped. The appendix was found to be normal.

An examination of the pelvic organs showed that the right Fallopian tube was distended, and the ovary swollen and adherent to the pelvic wall.

Although it seemed highly improbable that the stomach was at fault, it was thought advisable to make sure that there was no perforation: a small incision was made above the umbilicus, and the stomach examined and found normal.

As no other lesion could be found, the right tube and ovary were removed. Much pus was mopped up from the pelvis and both kidney pouches with dry sterile gauze, and the abdomen closed, with a Keith tube in to the pelvis.

The ovary and tube (unopened) were despatched to Dr. F. W. Andrewes, pathologist to St. Bartholomew's Hospital, with a request to see what organism could be cultured, and to make a vaccine.

He reported that a pure culture of pneumococci had been obtained from both inside and outside the tube, and suggested that, pending the arrival of vaccine, Pane's anti-pneumococcal serum should be used.

This was done, 20 c.c. being injected on May 8th and 9th.

On the 11th, vaccine (50 millions) was given,
" 13th, " (60 ") "
" 16th, " (200 ") "

On the 18th, some dulness of both bases of the lungs, with absence of breath sounds, was noted, and urticaria, which afterwards became general, appeared over shoulders and arms.

On the 19th, pain was complained of in the right axillary region, and an area of dulness, with absence of breath and voice sounds, was found above the liver. An exploring needle was used, but no fluid was found. That serous effusions are apt to ensue upon the use of Pane's serum may account for these areas of dulness.

There was no evidence of pneumonia at any time.

On the 24th, there was pain in the left hip, with limitation of movement, which however passed off in a few days.

The glass tube, which had been left in, was removed in 48 hours. For several days after the operation, the patient's condition was very grave. The temperature only returned to normal after five weeks, and, during the whole of this time, the pulse rate remained very high. The child was up on June 5th, and is now quite well.

The opsonic index was not taken, and it is difficult to estimate to what extent the injection of serum and vaccine assisted the recovery.

Dr. Andrewes made sections of the tube, and reported that they showed acute salpingitis, the submucosa being infiltrated with polynuclear leucocytes, and much thickened.

Remarks.—Considerable attention has recently been given to the subject of pneumococcal peritonitis.

The theories adduced as to the mode of origin are:—(1) A manifestation of a general blood infection; (2) infection from the intestines; (3) from the vagina.

In its sudden onset, with general abdominal pain and diffused non-localised tenderness, accompanied by diarrhœa, this case agrees with other recorded cases.

Dr. Wells suggests that, in the present case, the primary source of infection was the tonsillitis, and that the coincidence of the menstrual period predisposed to the development of the infecting organism in the tube; and this seems probable, though, unfortunately, we have no bacteriological report of the tonsillar exudate. On the assumption that the tonsillitis was the primary source of infection, then the probable course of events was: the infection of the tube from the blood, and an escape of some of its contents into the peritoneal cavity at the moment of the sudden pain and collapse, with fall of temperature to 95°.

The possibility of infection from the vagina having taken place, naturally occurs to one. Against this, however, is the absence of any vaginal discharge before or during the illness.

The other theory of a gastro-enteritis being the cause in such cases does not seem probable here, as there was no previous disturbance of the bowels, diarrhœa only starting at the same time as the sudden pain.

In the interesting collection of cases by Jensen, referred to by Mr. Ashdowne (*Lancet*, January 1906, p. 155), one case of pneumococcal peritonitis associated with ruptured pyo-salpinx is mentioned.

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NOTES FROM FOREIGN JOURNALS.

TREATMENT OF OXYURIS VERMICULARIS.

Nigay advises the following course for the treatment of thread worms:—

For a Child of Ten Years of Age.

1. Keep the patient for three days on milk diet.
2. Give each morning the following powder:—

℞.	Santonin	gr. ¾.
	Calomel	gr. iss.
	Sacchar. Lactis	gr. xv.

Misce. Fiat pulvis. Mitte tales numero III.

3. Give every evening an enema of glycerine, pure, or diluted with an equal quantity of water.

4. Apply around the anus the following ointment:—

℞.	Ung. Hydrarg.	ʒij.
	Glycerin. Amyli	ʒvi.

Misce. Fiat unguentum.

Nos. 3 and 4 are to be continued for ten days.

5. If worms are still found in the stools, give two of the powders, and an enema of—

℞.	Ferri Sulph.	gr. xlv.
	Glycerini	℥ij.
	Aq.	ad. ℥x.

Misce.

6. In the case of girls, the ointment must be also applied to the vulva to prevent the worms from entering the genitals.

7. The child must be prevented from scratching itself, and from putting the hands in the mouth.

NEPHRITIS DUE TO IMPETIGO.

Professor Hutinel observes that, in the case of children extensively affected with impetigo, it is far from unusual to find symptoms of nephritis; œdema of the feet and of the face, increase in the size of the liver, *râles* at the bases of the lungs, dilatation of the heart with irregular action and *bruit de galop*, small and frequent pulse, and albuminuria. Cardiac complications may supervene from staphylococcic and streptococcic infection, and the heart may also be burdened and distended by the œdema of the tissues, the functional failure of the skin, and the spasm of the vessels, toxic in origin.

The skin must be disinfected, and the scabs removed by means of moist dressings. Milk diet is better than dechloridized diet for treatment of the nephritis, and the heart may be stimulated by camphor in oil hypodermically. —(*Journal des Praticiens.*)

TREATMENT OF EPILEPSY.

Mayer holds that in every case, vegetarian diet, as nearly as possible complete, is preferable, and the epileptic will therefore eat little meat, besides abstaining from alcohol, tea, coffee, etc. In weakly patients, albuminoid food preparations (tropons, etc.) and iron are indicated, avoiding all overloading of the stomach. Rest in bed is of the utmost assistance, as well as the removal from the usual family surroundings. Hot baths with affusions and friction are better than douches; they act like tonics, and prevent the development of drug-rashes. Of the bromides, the sodium salt is the best for use, and should be given in free dilution, preferably in two doses a day. As a general rule, the daily amount given to an adult should not exceed 1½ drachms. Acne to an intolerable degree, due to bromides, is very rarely seen, and the dread of the injurious effect of bromine upon the faculties has no scientific basis, widespread though it may be. Cerebral torpor is a consequence of the disease, not of the drug. Bromide is eminently successful in cases in which severe fits only appear now and then; in cases with delirium, and other markedly psychic troubles, chloral is preferable. Flechsig's treatment by opium (¾ to 1½ grains three times a day), suddenly changed to 1½ drachms of bromide, gives good results in many cases in which bromide by itself fails. In Jacksonian epilepsy, operative treatment is not, as a rule, thoroughly satisfactory; the fits re-appear after a time, because the scar itself becomes in turn an epileptogenous centre. Besides, this form of epilepsy sometimes disappears spontaneously. Seeing that, in the last few years, operative technique has made such progress, it may be hoped that better results may accrue in the future. (*Therapeutische Monatshefte.*)

DESTRUCTION OF FLIES BY FORMOL.

The question of flies is so important in hygiene, and probably plays so important a part in the transmission of disease, that it is impossible to take too much interest in the best means by which these pests can be destroyed. Surgeon-Major Delamare describes, in the *Archives de Médecine Militaire*, a method which appears to yield excellent results, and which is quite simple. A solution is made of 1 part of formalin—the ordinary commercial formol containing 40 per cent. of formic aldehyde—with 9 parts of water. Plates, dishes, or other such shallow receptacles, are filled with this solution and placed in different parts of the room on tables, or on the floor. Twenty-four hours later—during the fly-season *bien entendu*—these plates and the area around them will be filled with dead flies and mosquitoes. Diptera, which have not fallen on the spot, may get as far as two or three yards away, and the floor is strewed with their corpses. This 10-per-cent. formol solution is a regular death-trap for flies and gnats, for it attracts them and kills them. They die a few moments after having moistened their probosces in the liquid. The solution requires renewal every 48 hours. An exposure for three days makes it less effective. Less concentrated solutions of formol, and solutions of other antiseptics, have been tried, but the results are much inferior. This method is far superior to the various forms of fly-traps in use, such as fly-papers, fly-catchers, and other sticky messes.

In hospital wards, plates containing the solution should be placed on the tables and window-ledges, and a smaller holder should stand at the head of each bed. The patients can then rest peacefully, freed from the incessant torment rife in the fly-season. Durand had the curiosity to make an approximate determination of the number of flies killed in 24 hours. In a room whose cubic contents were 521 cubic metres, seven days' calculation gave an average of 4,000 flies a day. For mosquitoes, the effect is increased by putting a small night-light on a glass-stand in the middle of the plate. It has been found that no advantage is gained by putting any sugary matter round the edge of the plate. The insects stop on the syrup or honey, and do not go so much to the formol. (*Journal de Médecine et de Chirurgie Pratiques.*)

CROUP AND MORPHIA.

Lesage and Cléret, after observing the use of morphia in croup, conclude that the contra-indication with regard to opium in diphtheria should only apply to opium and not to morphia. The latter has no disadvantages attaching to it, even in infants, and the writers are of opinion that, thanks to its anti-spasmodic properties, they have been able to avoid resort to tubage in a large number of suffocative attacks, in which there seemed to be no other possible treatment but immediate tubage. Their method of procedure is, when a child is brought up which exhibits symptoms of impending asphyxia, not to pass a tube, but at once to give a hypodermic injection of ¼, ⅓, or ½ c.c. (according to the age) of a 1-per-cent. solution of morphia hydrochlorate (= ♏iv. ♏vi., or ♏viiiss. of Liq. Morph. Hydrochlor.). This is followed in a few moments by the appropriate dose of diphtheria antitoxin. In the very large majority of cases the child goes off to sleep at once, the sucking-in ceases, and the breathing becomes quiet and regular. The morphia-sleep lasts for five or six hours, during which time the serum acts, and the child wakes up practically well. In some cases, which are, however, of rare occurrence, the morphia does not bring about so complete a relief to the symptoms, and asphyxia still threatens. Tubage may then be necessary, and the means for its performance should be ready at hand. The use of morphia is thus an actual method of alert expectation; if it does not succeed, there is always time for tubage. In other cases, in which the child is seen cyanosed and dying, tubage must be immediately performed followed by the injections of morphia and serum. The advantage of using morphia is that it reduces to a minimum the duration of the tubage. The tube can be withdrawn at the end of twelve hours, by which time the serum has acted. If symptoms of asphyxia present themselves afresh, the injection of morphia is repeated, and re-tubage thereby avoided, saving the larynx from the injurious effects of that procedure, always much greater than those of a first introduction. Morphia is therefore a valuable adjuvant, which permits of the avoidance of the complications engendered by a prolonged retention of the tube in the larynx. (*La Tribune Médicale.*)

A DENTAL SOAP.

In a communication to the Société Médicale des Hôpitaux, relative to the use of grey-oil in subcutaneous injections, Queyrat insisted strongly upon the attention to be given to the teeth, and recommends this soap, which prevents irritation of the gums:—

℞	Saponis Amygdalinæ	ʒx.
	Glycerini	ʒvj.
	Extracti Krameriae,	
	Sodii Biboratis	āā gr. xx.
	Spiritus Anisi	♏xxv.
	Spiritus Menthæ Piperitæ	♏vij.

Misce.

—(*Journal de Médecine et de Chirurgie pratiques.*)

TREATMENT OF ECLAMPSIA.

Rudaux sets forth in fullest detail, in *La Clinique*, the treatment of eclampsia, the following being the chief prescriptions:—

Treatment of the Premonitory Symptoms of Eclampsia with or without Albuminuria.—1. Milk diet and water, alternating the glasses of milk with glasses of Evian-water sweetened with lactose (ʒx. of lactose to the bottle). 2. Rest in bed in a warm room (64° to 68° F.) 3. Daily action of the bowels, giving at the outset on the first morning:—

℞	Tinct. Jalapæ,	
	Syrup. Rhamni	āā. ʒss.

Misce. Fiat haust.

and on the following days, alternately—

℞	Sodii Sulphatis	ʒss.

To be taken in half-a-tumblerful of water;

and

℞	Calomel.	gr. iv.
	Lactosi	gr. xv.

Misce. Fiat pulv.

To be taken in a little milk.

Every evening the rectum is to be washed out with a good quantity of warm boiled water.

4. 30 to 45 grains of chloral are to be taken in the 24 hours, *e.g.*, ʒss of syrup in a cupful of tisane at intervals, the last dose being taken at bedtime. If this is not borne by the stomach, the chloral must be given in enemata. Should the premonitory symptoms get worse in spite of the treatment, or if they have persisted for several days, they must be looked upon as grave, and recourse must be at once had, in addition to the foregoing, to a bleeding of from 12 to 15 ounces. The indication will be specially determined by the tension of the pulse.

Treatment of the Convulsive Attacks.—Chloroform for anæsthesia and a 20-per-cent. solution of choral must be ready to hand, and all dentures must be removed from the mouth. When the fit begins, a folded handkerchief must be introduced into the mouth, and the ends held between the dental arches in order to keep the tongue to the level of the mouth and to prevent bites. In order to prevent the patient from falling out of bed, one side of it should be pushed against the wall, while the free side should be guarded by an attendant, or boards may be placed along each side of the bed. The bladder must be emptied by using a soft catheter, and a waterproof sheet must be placed under the patient to prevent soiling of the mattress by involuntary micturition. Care must be taken to ensure that the patient is kept well covered up, that the room is kept warm, that the light is not strong, and that absolute quietness is maintained.

The medical treatment consists of:—

1. Administration of chloroform during the period of the fit.
2. Emptying the bowels by a large enema of a litre of boiled water with two tablespoonfuls of glycerine, or by a purgative enema of half-an-ounce each of senna leaves (washed in alcohol) and sulphate of soda in 8 ounces of boiled water.
3. The subsequent administration, slowly introduced, of an enema containing ʒj. of chloral hydrate (℥ss of the 20-per-cent. solution), the yolk of one egg, and 4 ounces of warm boiled water.
4. If the patient is not comatose, strict water diet must be given—plain water, boiled water, or Evian-water, 1 litre at least being given in the 24 hours. If coma is present, lavage must be performed.
5. "Massive" bleeding to 30 ounces, guided by the state of the pulse.

The chloroform must be continued as long as any convulsive attack remains; it may be given freely in large doses without danger. The bowels must be opened every day, even after the disappearance of the crises. If the patient can take it, one of the following may be given by the mouth:—

℞ Tinct. Jalapæ,
Syrup. Rhamni - - - - - - āā ℥ss.
Misce. Fiat haust.

or, Sod. Sulph, ʒv. in a tumblerful of water;

or, ℞ Ol. Ricini - - - - - - ℥ss.
Ol. Crotonis - - - - - - ♏j.
Misce. Fiat haust.

The dose of chloral in the 24 hours, whether given by the mouth, as syrup, or per rectum, should be from ʒij. to ʒiv.

When the convulsive attacks have ceased, the Evian-water may be replaced by skimmed milk or Kephir, and later by pure milk.

Recent work has proved that, if any effect is to be produced upon the blood-pressure, bleeding must be copious, upwards of 30 ounces.

If there is any need for disinfectant vaginal injections, Rudaux recommends this prescription:—

℞ Formol - - - - - - ʒijss.
Cupri Sulph. - - - - - ʒjss.
Terpinol - - - - - - ʒjss.
Spiritus Vini Rect. - - - - - ℥viij.
Ext. Geranii liq. - - - - - ʒss.
Misce. Fiat Mist.

One tablespoonful to be used in 3½ pints of boiled water.

THE APPLICATION OF ICE OVER THE HEART.

This method of treatment, to which Leduc invited particular attention last year, has been the subject of clinical observation by Déléarde, of Lille, the results of which, and of further observations, have now been published by Louart in his thesis. These observers have found that the application of ice to the præcordial area has several results: it lowers the temperature, it increases the force of the heart, it lessens the number of pulsations, and stimulates diuresis. It is, therefore, a valuable resource in the treatment of pyrexial diseases. It is in the treatment of enteric fever that this method has been specially used, and it is obviously a much simpler matter than the cold bath. Louart praises the ice-bag most particularly for hyperpyrexia, if, from the beginning of treatment, it is kept in place day and night over the præcordial area. He quotes observations, verified by experiment, which prove conclusively that ice has an effective action. In every case of enteric, of gastric disturbance, of pneumonia, and of pleurisy, ice has produced a striking fall in the temperature. It is interesting to note the oscillations produced by applying and removing the ice. Simultaneously with the fall of temperature, it was noted that the pulse became forcible, but the decrease in the number of beats does not always accompany the fall in temperature; so long as the pulse-rate does not come down to a normal figure, although the temperature may have fallen freely, the typhoid infection persists, and the application of the ice should be kept up. Recovery has begun when the pulse has regained its normal rate.

Déléarde uses the following technique: the ice must be applied exactly over the heart and not over the abdomen, for only in this way will the therapeutic effects be immediately obtained and more quickly put into effect. With the fall of the temperature there is a tonic effect on the heart, which is not to be despised in infectious diseases. A non-continuous application does not yield such satisfactory results as a permanent application. In the latter case, the curve of the temperature is much more regular. The sudden changes produced by the removal and the replacing of the ice-bag are of no assistance. The ice-bag must also be kept in place for several days after the temperature has fallen, until the pulse has regained its normal rate and volume. In this way will be avoided the little sharp rises in temperature, which are brought about by too early a suspension of the use of the bag. Provided that the ice-bag used is small enough, this method can be used for children of four or five years of age. Below that age it is difficult to keep it in position on the chest. The method of application differs in no way from that already employed for some years in pericarditis. The ice must be broken into small fragments, enclosed in a pig's bladder, or a rubber bag, fresh being supplied as soon as these are melted, which will be about every hour. Between the skin and the bag is interposed a flannel bandage of moderate thickness, one turn of which is taken round the body, and kept in place with tapes. Not the least tendency to form a scar has ever been noticed, but the constant watch over the patient will prevent this accident. In some cases the temperature has been observed to fall to nearly 95° F., but this condition of low temperature has not been followed by any complication. The ice-bag is taken away, a warm drink is given, and hot-water bottles are applied to the feet and trunk. The temperature soon goes up to normal.—(*Journal de Médecine et de Chirurgie pratiques.*)

TREATMENT OF SORE THROATS.

For some time past, Berliner has treated sore throats antiseptically, but by the usual way of the mouth. In many cases, however, relapses occurred, if at the same time nasal catarrh were present, the secretion from which passed into the naso-pharynx. He, therefore, acted upon the idea that, in order to deal more effectively with these sore-throats, and to prevent relapses, it would be a better plan if the remedy took the same road as the secretions. For this purpose, a slow-acting ointment was best to obtain a continuous effect, and the subjoined answers well:—

℞	Protargol - - - - -	gr. xxijss.
	(in Aq. frigid. ♏xl. dissolv.)	
	Adipis Lanæ - - - -	ʒjss.
	Menthol - - - - -	gr. jss.
	Saccharini - - - -	gr. v.
	Paraffini mollis - - - -	ad ʒj.

Misce. Fiat unguentum.

Of this ointment, the patient introduces into each nostril a piece about the size of half a pea, and lightly rubs it into the inner surface. When this amount is exhausted, of which he is made aware by no longer tasting the saccharine, he makes another application.

Catarrhal sore-throats are favourably influenced by this treatment, as well as the accompanying hoarseness. An inflammatory sore-throat (parenchymatous) runs its course, and cleans up more quickly. The method is also of use in the secondary treatment of nasal and pharyngeal diphtheria, as well as in coryza. (*Münchener medizinische Wochenschrift.*)

TREATMENT OF SYPHILIS.

According to Scholtz, actual experiments prove that mercury exerts an undeniable action upon the pathogenic agent of syphilis; and he considers that it is even clinically proven that this effect is also in action during the latent stage of infection; statements which support the treatment originally recommended by Fournier. Iodine does not appear to have any influence upon the spirochætæ, although Neisser's experiments upon apes suggest some prophylactic action for this drug. Atoxyl holds a position between iodine and mercury, but Scholtz is of opinion that it only acts in the tertiary stage, and in bad cases of syphilis, being therefore a valuable adjuvant. Since the discovery of the spirochæta there is no need to discuss the expediency of mercurial treatment when the chancre appears. One may rather hope, by energetic local treatment, to be able to check the generalisation of the infection. Excision of the chancre, or treatment by hot air, on the other hand, does not seem to be any use, because the pathogenic agents invade the organism from the first. The early treatment should always be energetic, for, if this precaution is neglected, there is a risk of the ultimate appearance of tertiary symptoms Scholtz has always found that patients, who, in the early stage of the disease, have several relapses, rarely suffer from tertiaries. These seem specially to attack those who have only shown slight secondary lesions. Doubtless, the frequent relapses bring about in the organism a more decided immunising reaction. Scholtz admits that treatment by inunction is really treatment by inhalation. It succeeds very much better, the longer the patient remains in bed, keeping his coverings and clothes impregnated with mercurial vapour, etc. Energetic friction separates the globules of mercury from the ointment enclosing them, and favours their evaporation. This method, on the other hand, has far greater chances of exerting an energetic action, if the patient is suffering from extensive exanthemata, especially papular or pustular. The altered condition of the skin allows the absorption of the mercury to take place more readily, and the therapeutic agent, in this way, will more quickly reach the glands, the principal receptacles of the spirochætæ.—(*Zeitschrift für aertzlich. Fortbildung.*)

A NEW METHOD OF INHALING MERCURY IN THE TREATMENT OF SYPHILIS.

Kromayer is making use of a mask of fine iron wire, covered with a double layer of molleton, impregnated with mercury in a state of minute division. Each mask contains 2 drachms of mercury. It is more conveniently worn at night. The therapeutic effect is often apparent by the third day, and attains its maximum by the seventh day. 160 patients, treated in this way, have been relieved of their specific manifestations more quickly than patients treated by inunction; a little less quickly than those who received injections of salicylate of mercury. The duration of the treatment has been thirty days, and it is necessary to renew the mask two or three times during this time. The method is easy of application, but the patients, during the first few days, sometimes complain of heaviness in the head. Toxic symptoms can be more easily warded off by withholding the mask, than when injections are being used.—(*Berlin. klin. Wochenschrift.*)

THERAPEUTIC USE OF WHITE BOLE.

Quite recently Stumpf wrote in praise of the treatment by bole, so extensively employed in former times. According to Stander, white bole appears to be bound to be greatly in request in all acute cases of gastro-enteritis in children, and of infectious catarrhs of the stomach and intestine. The therapeutic action is the same as that of clayey soil given in excess; it takes possession of the bacteria. Stander has observed a rapid result in 18 serious cases of acute infective gastro-intestinal catarrh, in 2 febrile cases of acute colitis with mucus and blood in the motions, and in 1 case of intoxication from food, the patients being of all ages. In the majority of cases, there is noticed a rapid disappearance of the fever, the almost instant cessation of vomiting, and relief of the somnolence and sweating, with a remarkably quick recovery, promoted by the early return to ordinary food. In the last-mentioned effect lies the chief merit of the treatment. Patients very quickly accustom themselves to taking the requisite quantity of the powder, about 4 ozs. In chronic cases, hardly any amelioration can be looked for, or rather such as there is, is only temporary. A dose of 6 drachms to 1 oz. of white bole, given every three days, has had a good effect upon the motions and meteorism in several cases of intestinal tuberculosis, one being severe tuberculosis of the large intestine, and another a case of serious ulcerative colitis.—(*Münch. med. Woch.*)

Reviews of Books.

The Border-land of Epilepsy. By SIR WILLIAM R. GOWERS, M.D. Lond., F.R.S., Consulting Physician to University College Hospital, Physician to the National Hospital for the Paralysed and Epileptic. London: J. & A. Churchill. Pp. 121. 4s. 6d. net.

PART of the subject-matter of this work will be already known to our readers, as most of it has appeared in the medical journals. Still, it is well to have the articles arranged in book form, as the subject is one of great interest and importance. Any discussion of this indefinite borderland can only be fitly undertaken by a man of long experience, who has kept careful notes of his cases, and these conditions are amply filled by the author.

The subjects of faints, vagal, and vaso-vagal attacks, vertigo, migraine, and sleep symptoms, are all fully discussed, and there are many interesting cases quoted from the author's wide experience. It is clearly written, and the diagnosis and treatment are ably discussed.

The book is a very welcome addition to the literature of medicine, and will be of special use to the general practitioner, who has had, till now, nowhere to turn for reference when confronted with one of these indefinite cases.

A Handbook of Medical Jurisprudence and Toxicology. By WILLIAM A. BREND, M.A., M.B., B.Sc., of the Inner Temple, Barrister-at-Law. Pp. 287. London: Charles Griffin & Co., Ltd.

THIS work is written by a medical man who is also a barrister. This is as it should be, for if only those, with legal as well as medical qualifications, were to write on this subject, we should be spared the mistakes, exaggerations, and omissions which occur in works not difficult to name.

We medical men refer to books on forensic medicine in cases where it is necessary for us to have exact information on points of law; and a book like this is of great value to us, while an inexact work, even though fuller, would be positively injurious to consult.

Although the whole book is excellent, the chapter which is of the greatest value is that dealing with "The Obligations . . . of the Medical Man." This part may be taken as a guide to the general practitioner in all matters, in which he cames into relation with the law, outside the domain of pure therapeutics. Although condensed, the subject is dealt with sufficiently fully to make a man know what to do in every case in which the law requires something from him.

"Evidence and Procedure" and the "Coroner's Court" receive attention in separate chapters.

Judging by what one sees and reads of the deplorable figures cut by medical men in the witness box at Coroners' Courts, it is easy to notice that the average practitioner is deplorably ignorant of forensic medicine. Not one in twenty is capable of conducting a post-mortem from a legal point of view. The subject is almost wholly neglected at the schools, and the London University has recently reduced the amount required to be known for the M.B. Degree. The consequence is that the Coroners are more and more taking the work out of the hands of the practitioner, and giving it to experts. It is quite possible that, before long, the general practitioner will never be called in to make a post-mortem, but that an expert attached to each Coroner's Court will take the work out of his hands. If this occurs, the practitioner will have no one but himself to blame.

In addition, there are many difficulties which medical men have to encounter—such as actions at law, loss of fees, legacies, etc.—which would have a different result if they were familiar with ordinary medical jurisprudence.

In conclusion, we can we feel certain that Dr. Brend's work on Forensic Medicine will take its place as the most useful, and the most accurate text-book on the subject.

Prostatic Enlargement. By CUTHBERT S. WALLACE, M.B., B.S. (Lond.), F.R.C.S., Surgeon to the East London Hospital for Children, and Surgeon to Out-patients, St. Thomas's Hospital, etc. *Bacteriology.* By LEONARD S. DUDGEON, M.R.C.P., Bacteriologist to St. Thomas's Hospital, Director of the Laboratories and Joint Lecturer on Pathology in the Medical School. Pp. 215. Illustrated. London: Oxford Medical Publications. 12s. 6d. net.

THIS book contains an account of enlargement of the prostate and its treatment. There is a description of the surgical anatomy of the organ, which follows the latest writing on this subject, and is fully illustrated. This is followed by a chapter on the experimental pathology and function of the genital glands. The morbid anatomy and histology of the prostate receive careful attention in two chapters.

An important section on bacteriology describes an investigation of the urine and the prostate gland, and the conclusion is arrived at that "bacterial infection is a secondary event" in enlargement of the prostate.

Diagnosis is then discussed. There are four chapters on treatment, and finally a short note is given on carcinoma of the prostate.

The author's views, derived from laboratory and clinical work, are fully stated. The illustrations are numerous and well executed. The book forms an interesting contribution to the literature of this much discussed subject, and should be carefully studied.

Bilharziosis. By FRANK COLE MADDEN, M.D. Melb., F.R.C.S. Eng.; Professor of Surgery, Egyptian Government School of Medicine; Senior Surgeon, Kasr-el-Ainy Hospital, Cairo. Pp. 78. Plates 24. London: Cassell & Co., Ltd.

DR. COLE MADDEN has written a careful and thoughtful monograph upon this disease, which his work in Egypt has afforded him much opportunity of fully studying. He has combined with his own observations the results of other workers in the same field, and is thus able to present a very complete account of the present state of knowledge regarding this parasite, and the ravages caused by its presence in the body. As it is a recognised fact that almost every Egyptian of the agricultural class in Lower Egypt has suffered from hæmaturia, due to bilharzia, at one time or another, the field for observation is extensive. Dr. Madden has made full use of his opportunities, and his book is a valuable addition to the knowledge of the subject. It is interesting to note that, after careful and patient research, no intermediary host has been discovered, and that man himself almost certainly acts as the intermediary.

Cancer of the Stomach. By A. W. MAYO ROBSON, D.Sc., F.R.C.S., Member of the Council, Royal College of Surgeons; Hon. Surgeon, Dreadnought Hospital, and Lecturer, London School of Clinical Medicine; Consulting Surgeon to the General Infirmary at Leeds; Emeritus Professor of Surgery in the Leeds University, etc., etc. Pp. 218 London: James Nisbet & Co., Ltd. 4s. 6d. net.

ON diseases of the stomach, Mr. Mayo Robson is an authority, and a small book on cancer of that organ is very welcome. The volume has been written chiefly for the general practitioner, with the view of helping him the more readily to recognise the primary symptoms of the disease, in order that the early surgical treatment may be undertaken, and the patient consequently relieved of much suffering. The chapter, which deals with the general diagnosis of stomach diseases, including cancer, is most practical and particularly useful. The book is well illustrated, and contains a number of excellent plates, many of which represent specimens in the museum of the Royal College of Surgeons of England.

Surgical Emergencies. By PERCY SARGENT, M.A., M.B., B.C. (Cantab.), F.R.C.S., Surgeon to Out-Patients, St. Thomas's Hospital; Assistant Surgeon to the National Hospital for the Paralysed and Epileptic, Queen Square; and Surgeon to the Victoria Hospital for Children, Chelsea. Pp. 256. London: Oxford Medical Publications.

THIS is a capital book, clear, concise, and suitably dogmatic, for, as the author observes, explicit directions are what are demanded in the case of emergency rather than a general discussion on the merits of various methods. Embodying, as it does, the teaching and practice of one of our great surgical schools, the advice given is thoroughly trustworthy and sound. It is a book, which is eminently suited to the general practitioner, and especially to those who hold appointments at the smaller hospitals, where operations of urgency are not an everyday occurrence: We congratulate Mr. Sargent on his book, and cannot, in justice, withhold our praise for the most excellent way in which the publishers have performed their share in the work of production. Handiness in size, good clear type throughout, and good binding, combine to make the reading of the book, apart from the excellence of the subject-matter, a real pleasure.

Surgery: its Principles and Practice. By various authors. Edited by WILLIAM WILLIAMS KEEN, M.D., LL.D., Professor of the Principles of Surgery and of Clinical Surgery, Jefferson Medical College, Philadelphia. Vol. I. Pp. 945, and index. 261 illustrations in text and 17 coloured plates. Philadelphia and New York: W. B. Saunders Company. To be complete in 5 vols, each 30s. net.

THE first volume of this new treatise on surgery is now before us, and we may commence by saying that its perusal has given us great pleasure.

In the space at our disposal, it is impossible to enter fully into a discussion of a book extending to nearly 1,000 pages, and we are therefore compelled to confine ourselves to generalities.

The subjects included in its scope are those which may be embraced under the head of general surgical pathology, inflammation, suppuration and its consequences, and repair, which, together with a short historical sketch of surgery and articles on the blood, on infection, and on immunity, comprise nearly the first half.

The second half of the book deals, in considerable detail, with more definite diseases. Tuberculosis, rickets, syphilis, and tumours are dealt with at special length, while less space is devoted to tetanus and other rarer diseases, together with those caused by parasites, and to wounds and contusions.

Where all reaches so high a level, it seems invidious to select, but we may perhaps be allowed to pick out, as especially praiseworthy, the chapters on Inflammation, Repair, Tuberculosis, and Syphilis, the authors of which are, respectively, Professors Adami, Francis Wood, Da Costa, and Edward Martin.

The book deserves little else than praise, although a few discrepancies appear between the various sections by different authors, as is always the case in works by many authors.

Should the succeeding four volumes maintain the present standard, a very valuable addition will have been made to the number of text-books of surgery at present extant.

A Manual of Prescribing for Students and Practitioners of Medicine. By C. R. MARSHALL, M.D., Professor of Materia Medica and Therapeutics in the University of St. Andrews. Assistant Physician to the Dundee Royal Infirmary. Pp. 373. London: J. & A. Churchill. 5s. net.

THIS useful little manual is by no means a book dealing merely with the Art of Dispensing, but a work written mainly for the general practitioner, to assist him in prescribing. With this end in view, a very instructive chapter has been added giving many examples of the incompatibility of drugs, both from the physical and chemical point of view. On looking through this chapter, we have gained many useful facts, and believe that others will do the same. The book is formulated upon new lines, and the author is to be congratulated upon its excellence.

On Treatment. By HARRY CAMPBELL, M.D., B.S., F.R.C.P., Physician to the North-West London Hospital, and to the Hospital for Diseases of the Nervous System, Welbeck Street. Pp. vii + 421. London Baillière, Tindall & Cox. 5s. net.

THE reader, who takes up this work expecting to read the usual details of treatment, will not find his expectations realised. The preface states that the author "treats of certain questions of therapeutics from his individual point of view." The range of the subjects is very wide, from "The Education of the Physician" to "Psycho-therapeutics," and accounts are given here and there of patients who consulted the author. A great deal of useful information is undoubtedly given, and, to the man starting practice, many of the hints will be found very helpful. We admit that it is easy to criticise, but, with some statements in the work, we can hardly be expected to agree. For instance, under the heading of "Rationalism and Empiricism," the author goes out of his way to attack those who endeavour to put treatment by drugs on a more scientific basis than it is at present, and, in other places, not very complimentary references are made to advanced physiology and pathology. This attitude of thought is, of course, familiar to us, and it is usually taken up by those who have not the leisure to keep themselves up to date in recent advanced work, and are consequently disposed to depreciate what they do not themselves understand. That this is not the position of the author is shown later in the work, where references are made to research work on enzymes, hormones, opsonins, etc. We know that common sense is essential in the making of a good physician, but, when it is combined with a knowledge of advanced scientific work, it results in a more ideal mental state for the diagnosis and treatment of disease; consequently we ought to give all honour to those who endeavour to advance medicine by accurate scientific operations. Broad generalisations, such as we meet with in this work, are much easier for the majority of us to make. However, taking the work as a whole, it is well written, and the various subjects are treated in a clear and readable way, and, although we may criticise some of the statements, we consider that all the articles are well worth thinking over.

Diseases of the Male Generative Organs. By Edred M. Corner, M.A., M.B., B.Sc., M.C., F.R.C.S., Surgeon to Out-patients, St. Thomas' Hospital; Senior Surgeon to Out-patients, Children's Hospital, Great Ormond Street, etc. Pp. 279. Illustrated. London: Oxford Medical Publications. 5s. net.

This small book contains a selection of the diseases affecting the male generative organs. Among other subjects dealt with are hydrocele, wandering or movable testicle, imperfectly descended testicle, and some diseases of the urethra. The author expresses original views in regard to these subjects. Gonorrhœa, which is referred to very shortly, might have been omitted, and the same may be said in regard to other venereal diseases. The author has had some difficulty in selecting the diseases for description, since the ground is already so well covered. The result is a small book, containing a great deal of information, but somewhat lacking in cohesion, and limited in scope. There are, however, points of interest in the volume, more especially the author's views on some of the diseases, which make it worthy of perusal.

An Essay upon Disease, its Cause and Prevention. By G. E. Richmond, M.D., B.Sc., B.A. (Lond.), D.P.H. (Camb.). Late House Surgeon, Guy's Hospital; late Demonstrator of Hygiene, University College, London; late Medical Officer Imperial Yeomanry Hospitals, Deilfontein, Pretoria, and Elandsfontein, South African War; late Medical Officer, Rotherhithe Tunnel Works. London: H. K. Lewis. 2s. net.

This is a well-written little book of 96 pages, divided into five chapters of which the headings serve to indicate its scope. These are (1) Life, Health, and Disease; (2) Influence of Diet and Environment on Disease; (3) Functional Diseases and their Causes; (4) Some Organic Lesions; (5) Some Suggestions for Prevention. Nearly half of the book is devoted to an explanation of the composition and function of the cells which constitute the life of the organism. Health is a condition in which all the cells perform their functions perfectly; disease, a condition in which the due performance of these functions is disturbed by poisons circulating in the blood. Hence the main object of the book is to establish the theory that a very large number of diseases are due to toxins in various articles of food, or to impurities arising from environment, and are, consequently, preventable. It cannot fairly be said that, in a small book of this nature, sufficient data are given for the complete establishment of the position set forth, but enough are mentioned to warrant very careful consideration, and the consequent arguments in favour of a readjustment of the duties and status of the Medical Profession are clear and convincing.

Preventable Blindness. By N. BISHOP HARMAN, M.A., M.B. (Cantab.), F.R.C.S. (Eng.), Ophthalmic Surgeon to the Belgrave Hospital for Children; Chief Clinical Assistant, the Royal London Ophthalmic Hospital, Moorfields; Senior Ophthalmic Assistant, the Middlesex Hospital; Oculist, London County Council Schools, etc., etc. Pp. 120. London: Baillière, Tindall & Cox. 2s. 6d. net.

IN a very concise form the author gives an account of that preventable disease—ophthalmia neonatorum—and its effects. He states that it produces more than one-third of the blindness found amongst school children, and, from his position as having the care of the blind children in the London County Council schools, he is able to give a very accurate estimate. There is one chapter devoted to an historical account of ophthalmia neonatorum, and this considerably adds to the value of a well-written and useful little book. We heartily recommend the book to all those engaged in midwifery practice, whether in private or in hospital, for it is pitiable to think of the number of blind eyes which might have been saved had proper preventive measures been taken by those responsible for the health of the newly-born child.

Squint and Ocular Paralysis. By E. LUCAS HUGHES, M.R.C.S., L.R.C.P., Clinical Ophthalmic Assistant, Royal Infirmary, Liverpool. Pp. 206. London: H. K. Lewis. 6s. 6d. net.

ALTHOUGH there are numbers of books dealing with the subject of squint, we must admit that the one before us is one of the most complete of its kind. The author has endeavoured to bring into line and compare the practical teaching of the English and Continental schools upon this important subject. The book is well written and to the point, but there is room for improvement, specially in the diagrams, some of which are anything but clear. At the same time the book is worthy of the careful study of the ophthalmic surgeon, and of all those who deal with the errors of refraction.

Diseases of the Larynx. By HAROLD BARWELL, M.B. Lond., F.R.C.S. Eng. London: Oxford Medical Publications. 5s. net.

MR. BARWELL has made the best possible use of the limited space at his disposal. It is difficult to give anything like a scientific description of laryngeal affections in a book which does not embrace affections of the nose, and, in a small handbook of 250 crown 8vo pages, one must not look for more than an outline of the subject. The separation of the nose from the larynx, and the strict limitation of size have only made Mr. Barwell's task the more difficult. With these restrictions before him, he has certainly done the best possible. His descriptions are clear and practical; his views are modern.

Notes by the Way.

We are now comfortably settled in our New Building, an illustration of which we published in the July number of The Practitioner. The full postal address is:—2, Howard Street, Strand, London, W.C.

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Medical Education.

As the President of the Royal College of Surgeons of England has set forth in letters to the *Times*, money is badly wanted, at the present juncture, for the purposes of medical education. An appeal for help in such a cause, we may reasonably hope, has only to be made in order to meet with an adequate response. The interests at issue are no narrow professional interests, but also concern the entire community of actual and potential patients; for every doctor imperfectly instructed in his science and art may be, at any time, a public danger. Circumstances, however, have made necessary this special appeal as distinguished from the general appeal for the support of hospitals. In the first place, medical education is more costly than it used to be, owing, among other causes, to the increasing employment of expensive methods and apparatus. In the second place, many hospitals have lost a certain proportion of their subscribers as the result of the hostile agitation of the anti-vivisectionists, to whose extravagant demands they most properly refuse to make any concessions. In the third place—the most important point, perhaps, of the three—the managers of the King's Hospital Fund, guided by the advice of a committee on which the medical profession was inadequately represented, have decided to withhold grants from all hospitals which devote any portion of their income to the maintenance of their medical schools. Hence a critical condition of affairs, calling urgently for remedial measures preferably in the form of subscriptions to hospitals, ear-marked for educational purposes.

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"Preliminary Science."

One of the points taken against the medical education given at hospitals needs to be met. Much of their money, it is urged, is spent in teaching "preliminary science," which might just as well be taught elsewhere. The system has been condemned as "wasteful and extravagant"; and it has been maintained that the medical schools should confine themselves to clinical instruction, the cost of which might be covered by the students' fees. The argument may have a plausible ring in the ears of laymen; but it is not really convincing. Science is a large subject. A man may know a great deal of science, and yet not know the right science for a particular purpose. It might be possible to make sure that the right science, and enough of it, was taught in Universities; but the majority of students come to the hospitals, not from Universities, but from ordinary boys' schools. Such subjects as chemistry, physics, and biology are, it is true, being better taught in our schools at the present time than at any previous period of our history; but even so—and in spite of the County Councillors standing over them—the curriculum is in very few cases adequate from the medical point of view. The projected Institute of Medical Sciences might have covered the ground if it had, as the Americans say, "eventualised." It has failed, however, to eventualise, for reasons which we need not now stop to discuss. The subscriptions have been returned to the subscribers. Mr. Justice Joyce, only the other day, ordered Alfred Beit's legacy to it to be repaid to his executors. And meanwhile the hospitals have to do the work themselves in order to make sure that it is properly done.

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Provincial Competition.

ANOTHER factor in the situation is the competition of the medical schools in the provinces. These tend to attract an increasing number of students, in the first instance, because they are cheap, and, in the second instance, because they are associated with Universities at which the dignified style of Doctor of Medicine (or Master of Surgery) is more easily obtained than in the metropolis. The schools indubitably turn out many good men, and the Universities are usefully related to the general educational scheme of things. They can fulfil all their proper functions, however, without drawing students away from London. London, after all, is the centre; and at the centre there will always be educational facilities which are not so readily available at places more remote. The men most competent to teach are always, for obvious reasons, most likely to be found there, whether they are actually engaged in teaching or not. Their experiments cannot be watched, and their methods cannot be followed anywhere else. It is at London, therefore, that the best, though not, of course, the only, medical schools ought to exist. Their disappearance, or even their decline, for lack of funds to support them would be a scandal and a disaster, putting back the hands of the clock of progress. The appeal for help, when the reasons why help is needed are understood, will surely not be made in vain.

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Contaminated Milk.

ATTENTION should be drawn to the Report on the Contamination of Milk issued by the Joint Committee appointed by the Councils of the County Boroughs of Bradford, Hull, Leeds, Rotherham, and Sheffield, and the Administrative Counties of the East and West Ridings of Yorkshire. Consisting of 113 closely printed folio pages, it cannot be adequately analysed in a paragraph. Broadly speaking, however, it is to the effect that serious contamination of milk is constantly occurring, which often might be, and therefore ought to be, prevented. There are already quite enough bacteria in the milk when it issues from the cow's udder; they increase and multiply while the milk is waiting to be consumed; and they are apt to be joined by other bacteria while the milk is on its way, by road, or rail, to the consumer. It may be said, in short, of the microbe, as Virgil, in the Æneid says of Rumour: *Mobilitate viget viresque acquirit eundo.* But this need not be so—or need only be so to a limited extent. Dr. Orr, the Committee's bacteriologist, has demonstrated, by valuable experiments, that the initial purity of the milk may be perceptibly enhanced if the cow's udders are carefully washed before milking. It is important, too, to reject the first draw of milk from each teat, as this contains the largest proportion of bacteria; and, for the rest, the essential is the observance of scrupulous cleanliness at every stage: the sterilisation of the cans, for instance, the avoidance of any work raising dust either before or during milking, and the conveyance of the milk by rail in cans with dust-proof lids.

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Leaflets.

THE subject derives increased importance from the results of the researches to which we have lately referred, indicating that contaminated milk was an even more active agent than had previously been suspected in the spread of tuberculosis. It will remain of grave importance, however, whether those researches do or do not ultimately support the conclusions to which they at present seem to point. The committee suggest that a leaflet, embodying the results of their investigations, might do good work in educating public opinion in the matter. It might, though it is always easier to write a leaflet than to get those whom it concerns to read it. Much of the contamination, however, takes place at stages, in the history of the milk, at which the consumer, however educated, is not in a position to protect himself; and this points to the necessity for rigorous inspection. A strong leaflet on that branch of the subject might do good, if addressed to the members of the Moderate party on the London County Council and their constituents.

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The Registration of Nurses.

PROFESSIONAL opinion is overwhelmingly in favour of the principle of the Nurses' Registration Bill, which passed its second reading in the House of Lords, without a division, on July 6; and an influentially signed manifesto in favour of it has been published. Of course, no measure of the kind can afford complete protection against incompetence. A nurse, once qualified, may become incompetent in the course of time without committing any overt act justifying her removal from the register; but so, for that matter, may a doctor. On the whole, the law that has been drafted would fulfil a useful function, protecting patients, in the majority of cases, from pretentious incapacity, and at the same time protecting women who have "given their proofs," from the unfair competition of women who have not done so. Bills of this character are a little apt to be massacred with the other innocents at the end of a Parliamentary session for the simple reason that they are not bound up with the fortunes of either party in the State; but they are, for the same reason, easier to carry through, when either party can be induced to put them in its programme. We trust Mr. Asquith's Government will prove amenable to the persuasion, which those who appreciate the necessity for the measure, are trying to apply.

Practical Notes.

CAMMIDGE'S C REACTION FOR THE DIAGNOSIS OF PANCREATITIS AND OTHER DISEASES OF THE PANCREAS.—The following is Cammidge's latest technique, with which he claims to get *positive* results in all cases of pancreatitis, *negative* results in three-quarters of all cases of malignant disease, in the healthy state, and (with very few exceptions) in non-pancreatic diseases. Most pathologists, it may be remembered, obtained anomalous results with his earlier methods (his A and B reactions) and independent observations with the newer process are very desirable.

The urine examined must be from a 24 hours' specimen, or from the mixed morning and evening excretion. If albumen is present, the specimen must be faintly acidified, boiled, filtered, and made up to the original bulk with distilled water. If sugar is present, it must be removed by fermentation with yeast, and if the urine is alkaline, it must be made just acid before proceeding.

Process. I.—To 40 c.c. of urine add 2 c.c. of strong HCl., place in a small flask with a funnel in the mouth (to act as a condenser), boil for 10 minutes, then cool the flask thoroughly in a stream of water, and make up the result to 40 c.c. with distilled water.

II.—Add slowly 8 grams of powdered lead carbonate, allow the mixture to stand for a few minutes, cool and filter through a close-grained filter-paper until the fluid is perfectly clear.

III.—Shake this clear filtrate with 8 grams of powdered tribasic lead acetate; filter several times, getting as clear a filtrate as possible.

IV.—Add 4 grams powdered sodium sulphate. Cool the flask in a stream of water and filter (to remove the lead as lead sulphate).

V.—To 10 c.c. of the filtrate add 7 c.c. of distilled water, ·8 gram of phenyl hydrazin hydro-chloride, 2 grams of sodium acetate, and 1 c.c. of 50 per cent. acetic acid. Boil the mixture on a sandbath for 10 minutes, and filter whilst hot through a small funnel moistened with hot distilled water. If the result is less in volume than 15 c.c., make up to that bulk with hot distilled water, thoroughly mixing the whole.

In cases of pancreatic disease, a light yellow flocculent precipitate is thrown down in a period ranging from a few hours upward. These must be examined microscopically, and will be found to consist of threadlike crystals arranged in sheaves and bundles. They dissolve in 10 to 15 seconds on being irrigated with 33 per cent. sulphuric acid.

VI.—A control test is carried out in exactly the same way, except that the preliminary boiling with HCl. is omitted; this, of course, gives crystals if sugar is present, and, in that case, the test has to be repeated after fermentation with yeast.

THE ESTIMATION OF SUGAR IN THE URINE.—This is a very simple process, if one of the modern methods is used, and should be carried out by every practitioner for himself. As a rule, no great refinement of accuracy is required for clinical purposes, and the whole process may be carried out in a few minutes, the best process is Bang's (which was described by Walker Hall in the Special Diabetes Number of THE PRACTITIONER, July 1907, to which the reader is referred for further particulars).

The advantage of Bang's method is that the diluted urine is not used as the solution with which the titration is performed. The same fluid always goes into the burette, which is thus always ready for use, and does not need to be cleaned after each estimation. In practice, the burette is connected with one of the self-filling appliances, and occupies but little room on the dispensary table. The process is as follows:—50 c.c. of the copper solution are taken from the stock-bottle by means of a 50 c.c. measuring pipette, placed in a 100—200 c.c. flask and boiled for three minutes. Allow this to cool (preferably hasten the process by placing the flask in cold water), and then titrate with the hydroxylamine solution until all colour is removed. The end reaction is very sharp and easily seen.

If the colour of the copper solution is entirely removed by the 1 c.c. of urine, the simplest plan is to add a second 50 c.c. and proceed as before, doubling the result obtained. The whole process need not take three minutes of actual work, though, of course, the boiling and cooling require additional time.

The following table gives the amount of sugar in grains per ounce, corresponding with the amount of hydroxylamine solution added in c.c. It is correct to the first place of decimals only.

Hydroxylamine.	Sugar.	Hydroxylamine.	Sugar.	Hydroxylamine.	Sugar.
44	2·1	29	8·5	14	16·5
43	2·5	28	9·0	13	17·0
42	2·9	27	9·5	12	17·6
41	3·3	26	10·0	11	18·3
40	3·7	25	10·5	10	18·9
39	4·1	24	11·0	9	19·6
38	4·5	23	11·6	8	20·2
37	4·9	22	12·1	7	21·0
36	5·4	21	12·7	6	21·8
35	5·8	20	13·2	5	22·6
34	6·3	19	13·7	4	23·3
33	6·7	18	14·2	3	24·0
32	7·2	17	14·8	2	25·0
31	7·6	16	15·3	1	26·0
30	8·1	15	15·9		

LATENT GONORRHŒA IN THE FEMALE.—The following method may sometimes be of value in the diagnosis of latent gonorrhœa in the woman. Place the patient in a good light, and identify the region of the orifices of Skene's tubules. Cleanse the locality, introduce a blunt pointed probe into the urethra, and make a gentle downward pressure along the sides of its walls. In some cases, a drop of pus may be expressed from each tubule, and microscopic examination may now reveal the presence of gonococci when they cannot be demonstrated elsewhere.

INTRAVENOUS INJECTIONS.—It is not sufficiently generally known that intravenous injections of normal saline solutions, antitoxin, and other fluids, can usually be given through an ordinary hypodermic needle without requiring any incision or the dissection of a vein. The best needle to use is one of platino-iridium, since it can be rendered absolutely sterile in the flame of a spirit lamp. It is mounted on a very short length of india-rubber tubing, which fits over a short length of glass tubing, the other end of which is connected (by means of a long india-rubber tube) with the funnel, wash-bottle, or other receptacle for the fluid which is to be injected. The whole apparatus may be sterilised by boiling, or, in an emergency, may be washed through with 1 : 20 carbolic lotion, and then with sterile saline solution. The process is as follows :—The funnel, tube, etc., are filled with the fluid, care being taken that all air is removed, and the tube is then clipped to prevent the solution from escaping through the needle. A vein is now rendered prominent by means of a bandage applied just sufficiently tightly to interfere with the venous circulation; as a rule, this will be applied over the upper arm, and the injection made into one of the large veins in the ante-cubital region. Having found a large and prominent vein (and, if possible, one not in the immediate neighbourhood of an artery) cleanse the skin over it in the ordinary way. Then introduce the needle about a quarter of an inch from the vein, lower the funnel and release the clip on the tube, so as to create a slight suction at the tip of the needle. Push the needle gently on until it enters the vein, which is shown by the entrance of blood into the short length of glass tubing. Now raise the funnel and release the bandage over the upper arm. The fluid will run into the vein at a speed dependent on the size of the needle and the height of the funnel.

This process is sometimes inapplicable in cases of hæmorrhage, shock, etc., since it is impossible to render a vein sufficiently distended for it to be identified through the skin. In many cases, however, gentle massage, after the bandage is applied, will accomplish this, or the arm may be allowed to hang down over the side of the bed for a few minutes.

DIAGNOSIS OF LOCOMOTOR ATAXIA.—Disturbances of the pain-sense are, of course, well known as important diagnostic features of tabes dorsalis, and often occur early, and are readily recognised. Thus there is very frequently a loss of pain, though not of sensation, when a fold of skin on the foot is sharply pinched ; or the patient may feel the contact and then, after an interval, which may be of several seconds in duration, experience the sensation of pain. Amongst the disturbances of the pain-sense, which are often overlooked, are the following :—(1) Analgesia of the ulnar nerve. In a normal person, firm pressure on this structure just above the elbow joint is extremely painful, but this sensitiveness is often lost. The peroneal nerve (tested by pressure behind the head of the fibula) is often affected in a similar way. (2) Hyperæsthesia of the skin of the trunk and abdomen to cold. This is tested by the application of a cold test-tube (containing ice, or water cooled by a spray of ether or ethyl chloride), which may be unpleasant or even acutely painful. (3) The sensitiveness of the muscles to deep pressure is often lost. This is best elicited by making firm pressure with the pulps of the fingers on the calf, making counter-pressure on the shin by means of the thumb; the muscles of the calf may be rolled beneath the finger-tips. In a normal person, this is severely uncomfortable, but, in tabetics, it is often entirely painless.

Probably the earliest and most constant symptom of locomotor ataxia is the presence of an excess of lymphocytes in the cerebro-spinal fluid. The actual numbers present should, in all cases, be counted by means of hæmocytometer. The method is extremely simple, being merely that used in the estimation of the leucocytes, except that there is no dilution of the fluid required. According to Emery, the numbers usually range from 50 to 200 per cubic millimetre.

CARDIAC FAILURE IN PNEUMONIA.—Dr. W. J. Hadley writes that cardiac failure in pneumonia may be brought about by any of the following causes:—(*a*) Toxæmia and fever; (*b*) increased resistance to the pulmonary circulation due to the consolidation; (*c*) abdominal distension so frequently met with; (*d*) constant pain; (*e*) restlessness, sleeplessness, and delirium. The chief signs of cardiac failure are as follows:—Increasing difficulty of breathing, distant or absent heart sounds, increased rapidity and irregularity of the pulse. For these conditions strychnine should be given as soon as possible. The following mixture will be useful:—

℞.	Tincture Digitalis - - -	♏v.
	Tincture Nucis Vomicæ - -	♏vi.
	Spiritus Ætheris - - -	♏xij.
	Spiritus Ammoniæ Aromat. - -	♏xx.
	Inf. Cinchon. - - - ad	℥j.

Misce. Fiat mistura.

Two tablespoonfuls to be taken every six hours,

Preparations and Inventions.

CYLLIN OBSTETRICAL LUBRICANT.

(London: Jeyes' Sanitary Compounds Co., Ltd.)

This new preparation of cyllin contains a sufficient quantity of the disinfectant cyllin to render quite sterile all skin and mucous membrane surfaces with which it may be brought in contact in gynæcological and in midwifery practice. It has the advantage that it is grease-free, and is readily soluble in water. It contains no caustic or toxic substances, and is supplied in collapsible tubes of convenient size.

NEW PACKING FOR "KEPLER" MALT PRODUCTS.

(London: Messrs. Burroughs Wellcome & Co.)

"Kepler" malt products are now issued in bottles of a much improved design. The mouth and neck of the bottle have been enlarged so as to admit of the easy introduction of a dessert spoon, and the shoulders of the bottle have been modified in shape so as to allow the contents to be easily and completely extracted. The old-fashioned "draw-cork" has been replaced by a metal cap, which is kept in position by an encircling metal band which fits closely around the thickened rim of the mouth of the bottle, and overlaps the lid. This rim is secured by a metal clip. There is a very convenient cork-lined metal lid which requires *no* corkscrew. It is readily taken off, and can be as readily replaced, and may be easily cleaned. We heartily commend these distinct improvements—everything is so simple.

CORYFIN.

(London: The Bayer Co., Ltd.)

Chemically coryfin is the ethylglycollic ester of menthol. It is an almost colourless fluid, with a faint odour of menthol. It is readily soluble in alcohol, ether, and chloroform, but sparingly soluble in water. The indications for its use are similar to those of menthol, but its action is more prolonged. It is supplied in small bottles, with a brush fixed into the cork, and can be readily painted over the forehead, in cases of frontal headache, or applied to the nasal mucous membrane on a little cotton wool, in cases of nasal catarrh.

THE PRACTITIONER.

OCTOBER, 1908.

ON THE PRE-OPERATIVE TREATMENT OF NON-MALIGNANT GASTRIC DISEASE.[1]

BY ARTHUR E. BARKER, F.R.C.S.,

Professor of Surgery at University College Hospital Medical School; Surgeon to the Hospital, and Consulting Surgeon to the Queen Alexandra Military Hospital, Millbank, S.W.

IT might be said that the treatment of non-malignant disease of the stomach before operation belongs to the domain of the family physician, and without doubt, up to a certain point, this would be true. But in practice, nowadays, we can hardly keep up this hard-and-fast line. Surgeons, who have to deal with such cases by the score, have not only to see that they are properly prepared for operation, but have to assist in determining whether they are in a condition demanding operation at all. Moreover, these specialists are constantly being asked to operate on patients with chronic gastric troubles, in regard to whom a careful examination of their history and present state convinces them that they are not beyond the reach of other measures without the immediate risks of operation, and of the ultimate disappointment which, in a certain proportion of cases, follows operation. If it were true that there were no dangers in the operations on the stomach, such as gastro-enterostomy, and that these were invariably followed by the relief of all symptoms, there would be but little objection to undertaking such procedures. But those of us who have watched the results of operative treatment of acute and chronic gastric troubles for many years, must candidly admit that such is not the case. Moreover, we are driven to the conclusion that far too many of these operations have been done on insufficient grounds. This is by no means to disparage the good effects of surgical treatment in proper cases. No one is more convinced of their benefit than I am. But having had, as I believe I may claim, a large experience of these cases, and having done my best to study their whole history previous to operation and after, and having occasionally been called upon to remedy drawbacks following operations, by both myself and others, the conclusion is forced upon me that greater discrimination is required in such cases, than has been exercised in the past, in order to avoid risk and disappointment.

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[1] A paper read before the Windsor Medical Society.

This is not always the fault of either family physician or surgeon. We are all, of course, liable to errors of judgment, but, apart from this, it is often the patients who turn the scale in favour of operation. Every one is familiar with the neurotic individual, afflicted with a certain amount of dyspepsia, who, sooner or later, becomes tired of the usual medical treatment, even though it may be of the best, and, above all, grows restive under the restrictions as to diet and exercise, very properly imposed upon him, to which his feeble self-denial is not equal. People of this class are very prone to get hold of the idea that nothing but some surgical interference, of which they hear so much nowadays, will relieve them. Moreover, they will very often not give due weight to the, perhaps few, but possible risks and disappointments, following the procedures, which every conscientious medical man is bound frankly to put before them. I have known such people, when they have been strongly dissuaded from operation, simply, so to speak, "take the bit in their teeth," and run off to get it done elsewhere, with the result that some months later they have been as great sufferers as or greater than before. We must not forget that patients with stomach derangements are particularly liable to hypochondria, and, perhaps, this is some excuse for such action as that just alluded to. But medical men have to be very much on their guard not to be misled by such individuals to act against their better judgment.

The family physician seems to me to be in a position of great delicacy in such cases, and to have a heavy responsibility put upon him. He often sees these patients from the first, and at a time when, if his advice and treatment were followed, they would in most cases be cured. But, though they will take any amount of medicine, as soon as directions are given as to restricted diet, exercise, and the like, their self-denial is not equal to the demands made upon it, and the doctor finds it very hard to enforce his whole treatment. In the end, he is often driven, even against his better judgment, to yield and bring his patient to a surgeon. Now if the patient is fairly reasonable and the surgeon candid, this may be productive of the greatest benefit without any operation. For, of late years, we surgeons, in the preparation of our patients for operation, have learned how very much may be done to relieve severe gastric derangement by means, which do not include any abdominal operation; measures which, if carried out by the family doctor, with our support, would obviate, in many cases, all need for the latter. From what one sees and hears, these measures are not so generally known as seems desirable.

In venturing to draw attention to some of these measures, I do not wish to trench upon the domain of the family doctor or physician. What I have myself learned from both, I most cordially acknowledge, but inasmuch as the patients, to whom the surgeon is called, are mostly in the more advanced stages of gastric derangement, the practically routine treatment, which he adopts, and which often results in such an improvement that operations are either postponed or not done at all, may not be without interest.

Let us suppose a familiar case. A patient between, say, 25 and 30, who for years has been the subject of chronic dyspepsia, begins to have severe pain in the epigastrium a couple of hours after food, accompanied by a feeling of distension, eructations, and occasional vomiting of more or less disagreeable material. Wasting has set in with a tendency to drowsiness and apathy. Many such are under the impression that they take very little food, but, if we compute what is actually swallowed in 24 hours, it will usually be found that they are taking far more than enough to keep them from wasting. Moreover, the diet is often quite unsuitable and frequently hopelessly so. They have unnatural cravings to which they yield. They will take, and probably have taken, a large quantity of medicine of various kinds, and often patent remedies by the advice of kind but mistaken friends, but they will not restrict their diet as they are advised to do by their doctor. And so they drift along for months or years, becoming more confirmed in their habits, and steadily wasting with greater pain and increased vomiting. Then someone tells them they ought to have one of the new operations which will completely and certainly restore them. Such patients may actually, in the end, insist on an operation which will usually be a gastro-enterostomy.

But, to judge by my own experience, a very large proportion of this class are well within the reach of medical treatment, and need no such operation, at all events at the time we see them.

Even at the risk of describing what may be familiar to many, I will mention what would be my own routine pre-operative course, a treatment which always renders an operation safer if it has to be done in the end, but which may sometimes obviate the necessity of such interference, if carried out thoroughly and patiently.

In the first place, I believe it is better to keep such patients in bed, not only because they will require less food, and there is consequently less work for the stomach to do, but because they are more under control as to the diet they receive, and can be better prevented from indulging themselves.

Next, all food given them should be cooked, in other words sterilised. But this would be of but little avail if it were contaminated in its passage through the mouth and throat. For this reason, the mouth and throat should be regularly and very thoroughly cleansed, and any foul stumps of teeth extracted or stopped. Indeed it is my own practice to send all such patients to the dentist for a thorough overhauling of their teeth before undertaking any active treatment. A very considerable number of those suffering from severe gastric disturbance, such as we are considering, have, as is well known, very bad teeth, and, not infrequently, pyorrhœa alveolaris. This is a two-fold evil. In the first place, all food is infected, and septic saliva is constantly being swallowed, and, in the next, the food is badly masticated, mixed, and prepared for digestion in the stomach. Attention to the mouth and teeth, then, should be scrupulously carried out in all cases, and as early as possible in the course of the treatment. And it is wonderful in how many cases a response rapidly follows these measures alone in improved digestion and general health and weight. Moreover, if an operation is ultimately required, the risks of lung troubles, which, in the past, have carried off a certain percentage of these debilitated sufferers, when other actors were favourable, are by this cleansing of the mouth materially reduced.

After all this preparation of the mouth, there is a fair prospect of getting the sterile cooked food into the stomach in a relatively pure condition. What the food should be is a matter on which experienced practitioners are as well able to judge as anyone in each particular case. For myself, I am inclined to rely on boiled bread and milk with salt, also Benger's Food, or beaten-up eggs and carefully prepared broths. These are given in small quantities at a time at first, and at regular intervals of a few hours. The patients will often say, and believe, that they are not having enough. But they must exercise some fortitude, remembering that a small quantity of suitable food, well digested, is far better than a large amount undigested and decomposing in the stomach. We are apt to forget, and the patient does not know, that one of the functions of the pylorus is to contract under the stimulus of badly digested food, and prevent its entering the duodenum. And, in this way, material is only in such cases allowed through the pylorus when it is fully and suitably prepared for absorption. If then too much food is given at one time, or, if the intervals between feeds is too short, the stomach will never be really empty and at rest, and what remains will be liable to undergo those putrefactive changes which are so often evident when we wash out the organ. Such putrid matter is not only very injurious to the mucous membrane of the stomach itself, but, if any of it passes the pylorus, it is hurtful to the nutrition of body generally. This is particularly well seen in very chronic cases, in which the patient has a dilated stomach with occasional vomiting, and is still feeding at short intervals. I have recently had one of the best examples of such a condition in the case of a wasted man, pale, and looking very ill. When my house surgeon put the usual tube into the stomach, five pints of such horribly fœtid material were siphoned off, that he and the nurse were sickened by it, and it required repeated washings for several days before the organ became clean. The result was a wonderful change in the man's appearance; he became cheerful and florid, put on flesh, and began to take food with relish and benefit. No operation was done on this man.

When such cases are constantly passing through one's hands, and when one sees the remarkable improvement which takes place from a treatment, which consists in nothing more than simply washing out the stomach effectually and repeatedly, one is forced to the conclusion that, for one reason or another, this proceeding is not so generally employed as should be the case. Many reasons might be given for this. In the first place, patients are believed to be averse from it as a revolting procedure. But this is far from being the fact in the vast majority of cases. At first, it may be found to be disagreeable, but, after being repeated a few times, it is quite rare to have any objections raised to it. On the contrary, so great is the benefit experienced that, as a rule, patients are clamorous to have it done. A member of our profession, whom I know, has stated that, for 20 years, he has been in the habit of washing out the stomach every evening, and always with the greatest relief. And some of my private patients have told me that, before coming to me, they for years have only been kept in reasonable comfort by regular lavage. But my contention is that, if this procedure were adopted in the earlier stages of so-called "dilated stomach," with all its concomitants, and followed, of course, by judicious dieting, we should hear far less of operations on the organ. One more example. About a year ago, a professional friend of mine was very anxious about his partner, who, some years ago, had had peritonitis, supposed to be due to gastric ulcer without perforation. From this attack he narrowly escaped with his life. No operation had been done. In the present illness, he had lost appetite and weight, was suffering from pain, distension, and occasional vomiting, great listlessness and drowsiness, and was unequal to his practice. In this condition I advised him to commence washing out the stomach morning and evening at first, and then every night before going to bed. He was, of course, to have light nourishing food, and was also to take bismuth mixture. He was in very low spirits about himself, and was averse from this treatment, but was eventually over-persuaded. A few weeks later, he wrote to me to say that he had carried out the washings of the stomach as directed, and was a new man. He had lost all his troublesome symptoms, and was enjoying life as he had not done for a long time.

Even those who are suffering from carcinoma of the stomach are frequently much relieved by washing out of the organ, and will put on weight. This is well illustrated by the case of a man, now under my care, with inoperable pyloric cancer. Under regular washings, he has put on 4 lbs. in a couple of weeks, and is much more comfortable than before.

Another objection, which is sometimes raised to the measure, is that, in cases of ulcer, it may excite dangerous bleeding or even lead to rupture. I think this is far-fetched, and have certainly never seen either occurrence in the hundreds of occasions, on which it has been done on my patients, although many of them have had bleeding ulcers. Moreover, there seems to be no good reason why it should produce either accident, if carefully carried out.

This naturally leads me to discuss what is the best way of carrying out the washing of the stomach. Perhaps to many such details may be unnecessary.

Nothing is required but the usual soft ½-inch rubber stomach tube with two *lateral* eyes near the point. To this a couple of feet of larger rubber tubing are connected by a short 3-inch piece of glass tube of slightly larger bore than the stomach tube. Into the second tube an ordinary funnel is fixed. The elevation of the funnel above the patient's mouth should never be more than 2 feet, and may usually be less. Much is learned from the first introduction of the stomach tube and its subsequent use. In cases of atony of the organ with dilatation, there will be but slight expulsive movements when the eye of the tube enters the stomach. Indeed there may be none, and nothing comes away except perhaps gas until the siphon action is set agoing by filling the tube with water, and then holding the funnel low over the side of the bed. In such cases, we surgeons have to be on our guard to watch closely whether the atonic condition is improved by frequent lavage. If it is not, no such operation as gastro-enterostomy is desirable. For nothing is so unfortunate for the patient as to have a gastro-enterostomy done, if the stomach has lost its tone beyond recall. Such an organ will not expel its contents through the new opening into the gut, and the patient will experience no benefit, or will perhaps be left in a worse condition than before. But if, on the other hand, there is a forcible stream ejected from the tube when introduced, and especially if fluid is driven out alongside of the tube, we know that the muscular coats of the organ are acting well, and need have no fear on this score.

In introducing the tube no lubricant is necessary except water. The use of glycerine is objectionable, as it is more or less irritating to the pharynx. The tube should be entered far back quietly and gently, and the patient encouraged to swallow during the act. Each time it is used, the throat will resent it less and less, and one should always pause, if the patient is breathless or otherwise troubled.

After siphoning off the contents of the stomach, a pint of water or normal saline is run in through the funnel held about a foot above the patient's mouth. The funnel is then held down over the floor until all the contents run away. Then it is well to estimate the capacity of the stomach by filling it until the patient feels discomfort. What runs off this time should be accurately measured. Anything over 2 pints indicates a certain amount of dilatation. Sometimes 5 pints will run in without distress, but only in cases of great enlargement. A repetition of this filling two or three times will not only show the size of the stomach but will also thoroughly cleanse it. When it is very foul, a little permanganate ot potash may be added to the wash out. Before removing the tube at the conclusion of the lavage, the position of the stomach and its shape may be usefully determined by inflation. This is easily done by inserting the nozzle of a Higginson's enema syringe into the tube, and by pumping in air until the organ can be mapped out by percussion. In some cases the advantage of this is very great.

After the air has been allowed to escape, and the stomach has been found to be clean, the time has come for a test meal in doubtful cases. An analysis made from such a meal taken from a stomach not previously cleansed, or otherwise conducted without extreme care, may be seriously misleading.

Such lavage, carried out every evening at least, and, in foul cases, every morning as well, is one of the most valuable forms of *treatment* for those cases of non-malignant gastric disturbance which I have in view. The stomach is placed in a state of rest for the night, and is ready for fresh food in the morning. Moreover, the patient will sleep more soundly and undisturbed by uneasy dreams, and so accumulate strength and cheerfulness.

But all this does not obviate the need of treatment by drugs, though, in many cases, it places them in the background. The use of carbonate of bismuth in 10 gr. doses suspended in mucilage, or taken with bread and milk, is one of the detergent remedies upon which I place much reliance, and it is given as a routine in all my gastric and intestinal cases. That it acts as an antiseptic, in the alimentary canal as on external surfaces, is fully believed by many of the best authorities and on good evidence. β-Naphthol, too, is useful.

Laxatives, too, will usually be required, also enemata if the rectum is atonic.

I have called all this the pre-operative treatment of non-malignant gastric disturbance, and it might be said what interest has a surgeon in laying stress upon it. A moment's reflection will, I venture to think, show that he has a great deal. So many patients come to us in a very advanced stage of chronic gastric dilatation with foul, atonic stomachs, who perhaps claim our interference, and yet who are so entirely unfit for it without a long course of washings, etc., that we ask ourselves, could not all this have been done before? Moreover, when we have treated them, as suggested above, for a couple of weeks or so, we so often find them benefited to an extent which seems to us to render an operation unnecessary, we can but conclude that, if the treatment had been begun earlier and carried out patiently, they might have been spared much suffering and risk. And then where the treatment *has* been efficiently carried out, and still, on a return to more varied diet, their symptoms reappear, we have less of that uncertainty about operation for chronic gastric disturbance, which must, in many cases, assail every thoughtful and conscientious surgeon, who is not sure that *everything* has been done short of operative interference, which he must know is not always so invariably certain to give relief as some would have us believe.

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FRACTURE AND REFRACTURE OF THE PATELLA, WITH SOME POINTS IN THE TREATMENT.

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[With Plates IV.—V.]

FRACTURES.

IN the *Annals of Surgery*, 1900, I published a paper on the Structure, Fracture, and Refracture of the Patella,[1] which dealt, to a large extent, with the ætiology of the injury. The intention of the present communication is to supplement that paper with notes on the treatment of these cases and the results, merely stating, in addition, the figures derived from eight years' additional and accumulated knowledge from the records of St. Thomas's Hospital. In my communication of 1900, 274 cases of fracture of the patella were reviewed. Since that date to the end of 1907, 230 cases have come into St. Thomas's Hospital, making the number, on which the present communication is based, reach 504.

The patella is broken in two ways: by direct violence, as by a blow on the knee which breaks the patella against the "anvil" presented by the femur; and by indirect violence, when the knee is flexed, and the patella, being in the quadriceps femoris, the extensor arc over the joint, is broken transversely across the condyles of the femur. From an ætiological point of view, fractures by direct violence are without much interest. They are usually comminuted, sometimes T-shaped, rarely transverse or oblique. Out of 504 cases, 10% showed comminution. Fractures due to indirect violence present several points of interest. First, they will be considered with regard to the situation of the fracture. When the transverse fracture is in the lower part of the bone, the upper fragment is the larger. When the fracture is in the upper part of the bone, the lower fragment is the larger.

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[1] *Annals of Surgery*, 1900, II., pp. 749–768.

When the fracture is about the centre of the bone, the fragments are approximately equal.

——	Fracture in Lower Part.	About Centre.	In Upper Part.
Second series of 215 cases	91 cases, 42·3%	89 cases, 41·4%	35 cases, 16·3%
First series of 191 cases[1] -	72 cases, 37·7%	87 cases, 45·5%	32 cases, 16·8%
Both series, 406 cases -	163 cases, 40·2%	176 cases, 43·3%	67 cases, 16·5%

The observations of the second series of cases confirm the result of the first, and also Hamilton's conclusion, that the fracture is four times as frequent in the lower half of the bone as in the upper half.

FRACTURES ABOUT AND BELOW THE CENTRE OF THE PATELLA.

First series - - - - -	82·2 per cent.
Hamilton - - - -	84·3 „
Second series - - - -	83·7 „

The second series of observations agrees with Hamilton, and differs from the first in making fractures in the lower half of the bone slightly more frequent than those about the centre. And as my second series of cases is derived from the observations of the four surgical registrars who followed me, Mr. P. W. G. Sargent, Mr. C. A. R. Nitch, Mr. J. E. Adams, and Mr. L. E. C. Norbury, besides some of my own, this latter series is more likely to be correct than the former, in which the registrars did far less. This confirms my previous observation, from an examination of the structure of the bone, that the lower part was the weaker.[2] The patella of a quadruped presents no such difference in strength in the lower portion of the bone as compared with that of the biped man; and there never has been a case of its fracture by indirect violence.[3]

When a human patella is broken by indirect violence, the situation of the fracture will always, or practically always,

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[1] *Annals of Surgery*, 1900.

[2] *Lancet*, 1898, October 1.

[3] *Journal of Comparative Pathology and Therapeutics*, 1901.

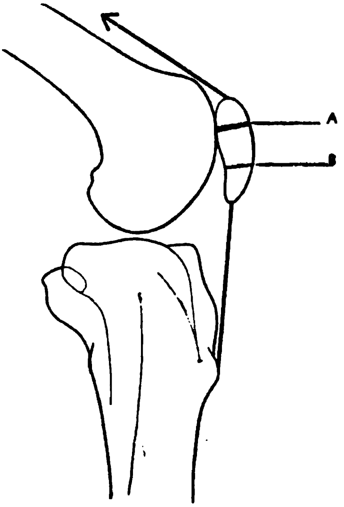

Fig. 1.—*Side view of femur, tibia, and patella. The patella is fractured where it is in contact with the femur at* A*; a contact fracture. At* B *is indicated a non-contact fracture, the patella not being in contact with the femur at that place.*

be where the bone was in contact with the femur. In a former communication, I have called these "contact fractures," to distinguish them from the rare non-contact fractures. As an example of non-contact fractures may be quoted the rare lesions which do not involve the articular surface, generally the separation of the beak of the bone. On the articular

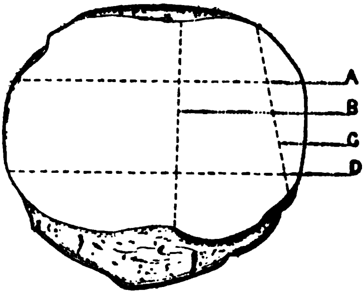

Fig. 2.—*Diagram of the articular parts on the patella.* A *is the flexion line, marking the lower limit of the contact area in extreme flexion.* B *is the vertical line dividing the fracture into two halves.* C *is the line delimiting the area of permanent contact with the femur.* D *is the extension line marking the upper limit of the contact area in extension. The area between the lines* A *and* D *is in contact with the femur in semi-flexion.*

surface of the patella are two horizontal and two vertical lines. The smaller of the two vertical lines demarcates a portion ot the articular surface which is in contact with the internal condyle of the femur in all positions of the joint. The upper of the horizontal lines marks the lower limit of the articular surface in contact with the femur in extreme flexion of the joint. The lower of the horizontal lines marks the upper limit in contact with the femur during full extension of the joint. The articular surface between these two lines is that in contact with the femur in semi-flexion. In consequence, the situation of the fracture will indicate the position of the knee when the injury occurred. And it may be stated that—

40·2 $^{0}/_{0}$ of fractures occur with slight flexion of the knee.
43·3 " " " semi- " "
16·5 " " " full " "

Of the 40·2 per cent. of fractures occurring in slight flexion, the majority by far were found near the lower horizontal line. In fact, as one proceeds to the upper and lower poles of the bone, fractures become rare, so that it is approximately true to say that about 75 per cent. of fractures occur within the middle two-fourths of the bone. In these cases, the portions of the articular surface in contact with the femur are the area of permanent contact, and the part between the two horizontal lines (Fig. 3). The area of contact, indicating the situation ot

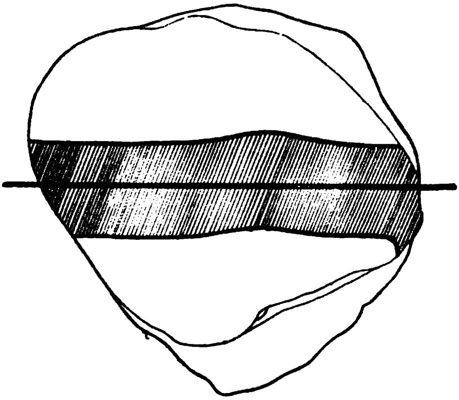

Fig. 3.—*Diagram of the articular surface of the patella. The shaded area indicates the part in contact with the femur during semi-flexion of knee. The dark line shows the resultant transverse fracture.*

the fracture, the shape of the area of contact will decide the direction of the fracture. In these cases, it will be approximately transverse, as shown in figure 3. When the knee is slightly or fully flexed, the contact areas will, as indicated in the Figures 4 and 5, give rise to oblique fractures. Clinically, the slighter degrees of obliquity are easily overlooked, particularly so when the fragments are drawn apart from each other.

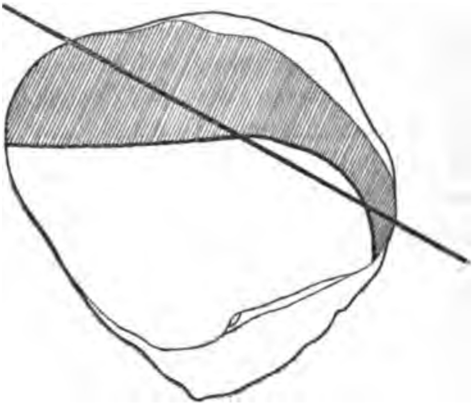

Fig. 4.—*The articular surface of the patella showing the shaded area in contact with the femur in extension or slight flexion of the knee. The black line shows the obliquity of the fracture which results in this position.*

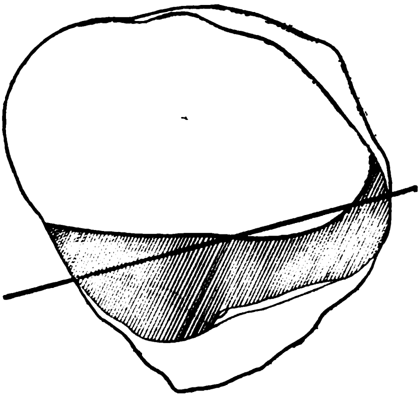

Fig. 5.—*The shaded part of the articular surface is that part in contact with the femur in full flexion of the knee. The oblique line shows the direction a fracture will take in this position.*

PLATE IV.

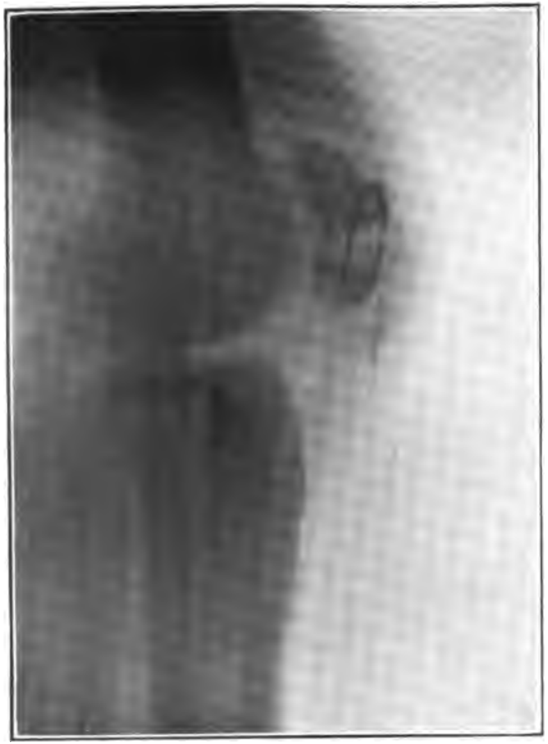

Fig. 6.—*Skiagraph taken some time after the operation of wiring the patella from a man who had an excellent knee. Note the separation of the fragments, the slackness of the wire, and the slight tilting of the lower fragment, and the fibrous union.*

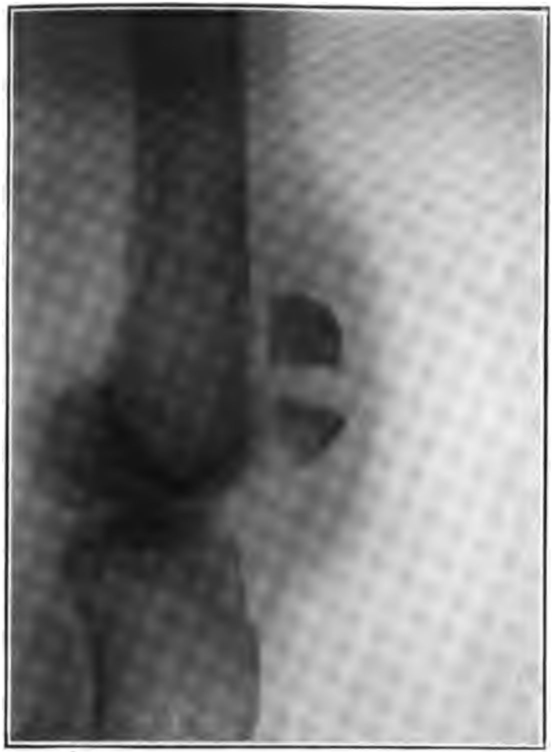

Fig. 7.—*Skiagraph taken some time after the patella had been sutured with silk. The separation of the fragments is noteworthy.*

PLATE V.

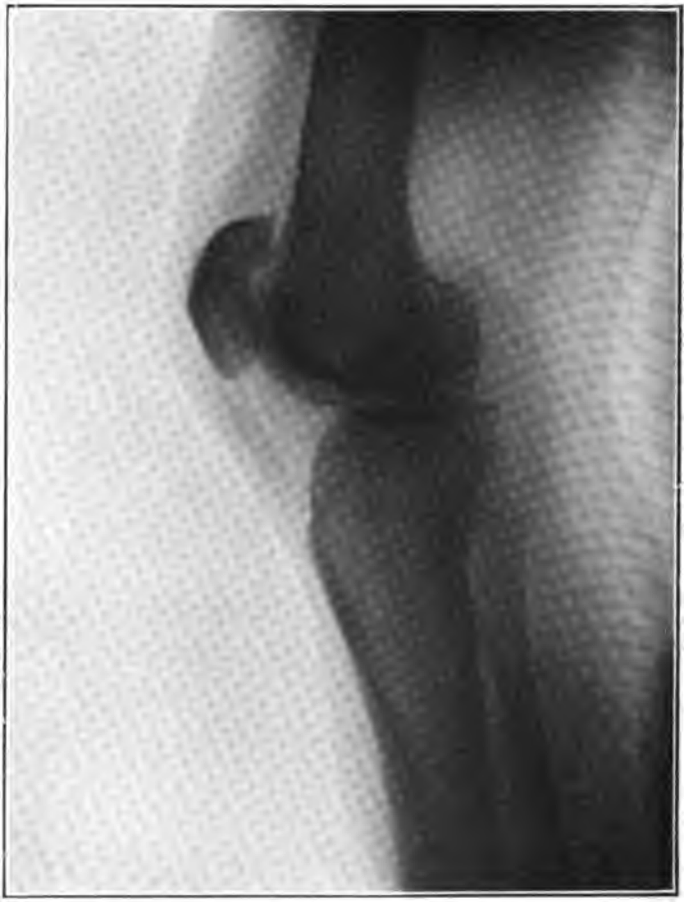

Fig. 8.—*A skiagraph taken some time after the suture of the fragments of a broken patella with silk. There is apparently bony union, which is more often obtained with fractures in the upper part of the patella than when they are lower. The woman has an excellent knee.*

In a communication to the Anatomical Society of Great Britain and Ireland, in 1900, on the "Varieties and Structure of the Patella of Man,"[1] I showed that, according to the shape of the bone, the following table could be constructed :—

Triangular patellæ - - -	66 per cent.
Oblique patellæ - - - -	20 „
Elliptical patellæ - - -	9 „
Circular patellæ - - - -	5 „

A further examination showed that the external shape of the bone had little or no influence on the shape of the articular surfaces. So that, because a patella is oblique, there is no reason for its fracture by indirect violence to be oblique as well. This confirmed a clinical observation already made, and added a further proof that it is the configuration of the contact area of the patella with the femur which causes the direction, transverse or oblique, of the fracture.

The figures for this second series of St. Thomas's cases were—

Transverse fracture - - -	86 per cent.
Oblique fractures - - -	4 „
Comminuted fractures (more than 2 fragments) - - - -	10 „

Oblique fractures were found in 4 per cent. of the series of clinical cases, whilst oblique-shaped patellæ formed 20 per cent. of the anatomical series, demonstrating that the mere shape of the bone has little influence on the direction of the fracture it may sustain. Of the 504 cases, 73 per cent. were males and 27 per cent. females. More than two fragments resulted from the fracture in 10 per cent. of the cases. Four fragments were found three times, never more. The fracture was compound in rather under 1 per cent. of cases, of which the greater number were refractures in which the operation scar had become adherent and torn at the second fracture of the bone. Of 486 cases, it is possible to give the side of the injury: in 55 per cent. it was on the right side, in 44 per cent. it was on the left, and in 1 per cent. it was bilateral.

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[1] *Proc. Anatomical Soc.; Journal of Anat. and Phys.*, 1900, pp. XXVII and XXVIII.

After other methods of treatment:—

Within	1	year,	4, 4, and 6 months	3	cases.
,,	1–2	years,	1, 1, 1½	3	,,
,,	2–5	,,	2, 3½, 4, 4, 5, 5	6	,,
,,	5–10	,,	6, 7, 7, 9	4	,,
,,	10–15	,,	10, 11½	2	,,
,,	15–20	,,	17, 18	2	,,
Over	20	,,	3	1	,,
				21	,,

Refracture of the patella occurred after suture—

Within	3	months	In 41	per cent.
,,	3–6	,,	,, 16	,,
,,	6–12	,,	,, 12	,,

In all, 69 per cent. occurred within the first year, and only 12 per cent. after three years had elapsed.

After treatment by massage and splintage, only 14 per cent. occurred within the first year, and 86 per cent. afterwards. The explanation for this is fairly obvious. Those, who have had their patella sutured, are allowed to use their leg freely long before those who have been treated by other means or who have broken other leg bones. This suspicion is confirmed by the fact that, in by far the majority of cases of refracture after suture, the second fracture has been through the same place as the first, breaking or untwisting the wire or other suture used. In the last 20 cases of refracture admitted to St. Thomas's Hospital, the lesion was through the same site as that of the original fracture in 19, 95 per cent. In the other case, the refracture occurred four years after operation, and below the original fracture. This proves that, after suture, the line of union between the fragments constitutes a weak place, particularly for the first three months after the operation; from this date onward the danger of refracture becomes progressively less and less.

In many of the cases of refracture, it was found that perfect freedom of movements of the knee had never been restored, and, it may very well be, that the refracture occurred as a result of the combination of this disability, and the over-confidence engendered by the operation. The wire or suture used to approximate the fragments is nothing more than an internal splint, the result of the treatment depending on the union between the bones, and in no way on the material used for the suture.[1] The advantage of operation is that it allows of early movements and the restoration of complete function to the joint. So that no surgeon must be content until full movements of the joint have been restored.

I would particularly emphasise the importance of preventing the patella from becoming adherent to the femur. As an example of this, I may quote the disastrous case of a lady who broke her patella for the second time. On this occasion her doctor persuaded her to have the fragments wired together. I did this, using two of the strongest silver wires. The patient was, from the point of view of treatment, utterly impossible, refusing all massage and movements, and insisting on going home within ten days, etc. Of her own free will, she began exercising the knee about two months after the operation, by which time the patella was firmly fixed to the femur. This was done by standing on the leg, and attempting to bend the knee forcibly by means of the weight of the body. In course of time, she untwisted the wires, and tore the union between the fragments. This case is to be regarded as wholly due to the patient refusing to accept the great and only benefit operation confers, *the early use of massage and movement.*

Had she accepted this, the upper fragment of the patella would never have become adherent to the femur; thus putting the quadriceps out of action and preventing voluntary active extension of the knee, but allowing passive flexion of the joint by the weight of the body when standing, with the danger of refracturing the patella. The adhesion of the patella to the femur must be regarded as a most important factor in leading to the refracture of the patella. Besides the above, it causes the weakening of the texture in the bone itself. Normally, the patella is a strong bone made up of interlacing traction and pressure lamellæ. By its adherence to the femur, the traction and pressure, exacted on it by the quadriceps extensor femoris, are very largely obviated, and the bone, having no longer to bear the same strain, degenerates and becomes softer. So that, in trying to loosen one of these adherent patellæ under gas, the bone was transversely refractured. Hence I regard the obtaining of free movement of the patella on the femur as the most important object of the treatment of cases after suture of the fragments.

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[1] *St. Thomas's Hospital Gazette,* March 1908, pp. 47-49.

If the percentage frequency of refractures of the patella is calculated, as they were found to have occurred after the operation of suture and after treatment by splints, massage, movements, etc., it will be found that refractures are slightly more frequent after operation than after the older methods of treatment. The percentage of refracture after operation is 10; and after the older methods of treatment 9. This slightly increased tendency to refracture after operation is completely outweighed by the fact that those, who have undergone operation, have, or should have, a fully functional knee joint; which those, who have been treated by the other methods, frequently have not. Thus the advantages of operation are very great. And it is a striking fact that refracture occurs most often in those cases in which the movements of the knee have not been perfectly recovered, especially if the movements of the patella on the femur are not free. So that, if only more attention was paid to this most important part of the treatment, refracture, after suture of the fragments, would be less frequent than it is.

It will be of advantage to consider the various factors, which will assist in aiding the patient to recover perfect movement in his joint and obviate the danger of refracture.

First.—Early operation. In examples of fracture due to indirect violence, the skin is not bruised, nor has its vitality been in any way impaired. Operation should then be undertaken as soon as can be arranged, say, about twelve hours after the injury; that is to say, when all bleeding has stopped.

Secondly.—All blood clot and other foreign matter must be removed from the joint. Indeed the more perfectly this is done the more chance of a perfect result. This is important because we now know that the staphylococcus albus is grown from this blood clot, so that if any is left behind, the reparative inflammation excited may interfere with movements of the joint, and perhaps lead to adhesions within. Hence I would lay great stress on the removal of clots from within the joint, and less on the removal of clot from between the fragments, for fear of making any of the torn vessels begin to bleed again.

Thirdly.—After suturing the fragments of the bone together with wire, or silk when a special care must be given to the knot, the torn lateral expansions on either side of the patella are united by sutures. The suture of the bone can be done subcutaneously. Special care must be taken when the lower fragment is very small, because it may be tilted when the suture is tightened so that its broken surface looks forward, and its articular surface to the broken end of the upper fragment. The suture of the lateral expansions can be done through lateral incisions.

Fourthly.—Gauze and collodion dressings are best with no splint, or the limb flexed.

Fifthly.—Gentle movements and massage should be begun a day or two after operation, and slowly increased in power and extent. Particular attention should be paid to moving the patella laterally on the femur.

Sixthly.—All wounds must heal by first intention.

Seventhly.—The patient should not bear weight on his foot until after *full* movement has returned in the knee joint, probably from four to six weeks.

It is desirable to avoid a scar over the front of the patella for two reasons. First, the reparative inflammation, within and beneath it, will cause sufficient pain and tightness to interfere with the massage and movement. Secondly, the scar may become adherent to the bone, restricting movement and possibly leading to a compound refracture.

STATISTICS OF CASES OF FRACTURE OF THE PATELLA ADMITTED TO ST. THOMAS'S HOSPITAL, 1890–1907 INCLUSIVELY.

Total number of cases, 504.

Fracture in lower part of bone - -	40·2 per cent.
„ about centre „ „ - -	43·3 „
„ in upper part „ „ - -	16·5 „
Fractures in lower half „ „ - -	83·5 „
Triangular-shaped patellæ - - -	66 „
Oblique „ „ - -	20 „

Elliptical-shaped patellæ	9	per cent.
Circular „ „	5	„
Transverse fractures	86	„
Oblique „	4	„
Comminuted „	10	„
Compound „	1	„
In male subjects	73	„
In female „	27	„
On right side	55	„
On left side	44	„
Bilateral	1	„
Patella sutured	65	„
Treated by splints and massage	35	„

Earliest period in which fracture occurred, between 5–10 years.

Period at which fracture occurs most frequently, between 30–40 years.

Next period at which fracture occurs most frequently, between 40–50 years.

Latest period in which fracture occurred, between 70–80 years.

STATISTICS OF CASES OF REFRACTURE OF THE PATELLA.

Total number of cases, 55.

Frequency of refracture	11	per cent.
„ fracture of other patella	1	„
„ refracture after suture of the fragments	10	„
„ refracture after other treatment	9	„
In male subjects	84	„
In female subjects	16	„
Of right patella	56	„
Of left patella	44	„
Bone twice fractured	85	„
„ three times fractured	9	„
„ four times fractured	6	„
Compound fractures	7	„
After suture, percentage of refractures within the first year	69	„

After suture, percentage of refractures after the first year - - -	31 per cent.
After suture, percentage of refractures after three years had elapsed - -	12 „
After other treatment, percentage of refractures within the first year -	14 „
After other treatment, percentage of refractures after the first year -	86 „
Percentage of cases of refracture through the same place as the first fracture -	95 „

SOME FURTHER POINTS IN THE TREATMENT.

Fractures of the patella are very similar to fractures of the olecranon, and, for purposes of treatment, it is well to divide them into those due to direct violence, and those due to indirect violence. A distinction can be drawn between these two classes of fracture, similar to that which has been drawn between them when considering fractures of the olecranon. In fractures by direct violence, there is little separation of the fragments from each other. Whilst in fractures due to indirect violence there is obvious, and sometimes great, separation. This degree or amount of separation is very important clinically. Because the greater the separation of the fragments, the greater will be the tearing of the lateral expansions of tendinous and fibrous tissue by the sides of the patella. If the lateral expansions are much torn, they must cicatrise and shorten, greatly restricting the freedom of movement of the patella on the femur, and impairing the value of the limb after its treatment for fractured patella. Thus, if there is little separation of the fragments from each other, and therefore little tearing of the lateral expansions, the fracture probably arose through direct violence, or very little indirect violence, and the case may be treated with rest and massage, followed by movements. If, on the other hand, the separation of the fragments from each other is large, and the tearing of the lateral expansions great, then the case must be treated by operation and internal direct splintage, because external and indirect splintage is of little use. If these latter cases are not treated by internal direct splintage, the upper fragment will become tied down to the femur by the cicatrisation of the torn lateral expansions, the movements of the knee will be much restricted, and, owing to the fixation of the upper fragment, the fibrous union between it and the lower will become stretched by the bending of the knee with the weight of the body, the patient at the same time losing control over the movements of the knee. Whilst if the internal splintage is followed by massage and movement, the upper fragment is kept free and movable. Movement of the patella on the femur is a very important part of the treatment of cases of fractured patella.

When an aseptic ligature or suture is left in a clean wound in the soft parts, it excites inflammatory changes in the tissues around, which end in its encapsulation by fibrous tissue and its retention within the tissues. When two portions of bone are joined together by internal splints, such as wires, screws, etc., the bone attempts to deal with them in an exactly similar manner to what the soft parts do. But, in order to become inflamed, it is necessary that the hard constituents of the bone should be absorbed so as to allow the blood vessels within the Haversian canals to expand, and accomplish the stage of hyperæmia in the course of the reparative inflammation. This absorption of the hard bone is called a rarefying osteitis, and converts the firm bone into soft material. In the case of wires and screws, a rarefying osteitis means that the wires and screws are made loose by the softening of the bone round them. The loosening of the internal splints means that the bones are no longer held firmly together and may move on one another. If the bones are allowed to move on each other, and especially if that movement is encouraged by massage and exercises, as in fractures of the patella and olecranon, more and more bone is softened by inflammation, the wire becoming looser and looser, and the fragments farther and farther apart. Union takes place by fibrous tissue, not by bone. If, on the other hand, the two bones are prevented by external splints from moving on each other, the inflammatory changes will proceed in the softened bone until the wire or screw has become encapsulated with fibrous tissue which may become bony, osteosclerosis, and subsequently bone. In this case there will be bony union, and the internal splint will be retained. It will be seen from this that the utmost which an internal splint can do is to hold the fragments in firm apposition for perhaps two weeks; then, if external splints are used in addition, there will be bony union; if massage with movements is used, the union will be fibrous, and likely to remain so, though at times a fibrous union ossifies.

The necessary loosening of an internal splint in the natural sequence of events is a very important stage in the treatment of fractures by direct splintage, and shows that internal splintage must be supplemented by external splints when bony union is required, stability being more essential to the good result from treatment than mobility in the particular case. If cases are treated by early massage and movement, fibrous union alone is likely to occur.

In addition to the softening of the bone round the wire, there is another and equally important factor in this unavoidable loosening of the internal splint. Repair takes place in the fractured ends of the fragments by means of a process of inflammation ending in the formation of callus. The first step in these reparative changes is the softening of the ends of the fragments by means of a rarefying osteitis, which are held firmly together by the internal splint. The wire in consequence becomes loosened, and the fragments are separated from each other by thin zones of soft young connective tissue, the callus permitting of their moving a little on each other. The accompanying figures show how the wires are loosened apparently cutting their way through the bone, how the fragments separate from each other, and the union between them is by fibrous tissue, not by bone. They illustrate cases which had splendid knees some three or four months after the operation, showing that short fibrous union of a fractured patella does yield an excellent result. Perhaps a better result than bony union could show. Because after the healing of the fractured patella, the bone is invariably enlarged, and being rigid, is consequently much more likely to be refractured across the femoral condyles than if the bone is not rigid, a fibrous union between the fragments permitting them to move a little upon one another. In the first two cases[1] only one wire was used to unite the fragments. In the second two,[1] two wires have been used. It is very noteworthy that the two wires have not improved upon the conditions found when one wire alone was used. Indeed, the fragments of the patella seem more softened by inflammation, and rendered less opaque to the X-rays, the shadows in the skiagraph being less distinct, when two wires have been used.

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[1] Reference is made to lantern slides used to illustrate the lecture which have not been reproduced.

In addition to this obvious failure of a wire to retain the fragments in apposition, there is also the fact that the wire sometimes gives trouble and has to be removed. To obviate this, a trial was made by uniting the fragments with strong silk. This I have done on many occasions, and the results obtained have been quite as good as, if not better than, when a wire has been used. One very important point in technique, ignorance of which has made it necessary to do a case over again, is that a knot in silk is very likely to slip and be undone when the knee is bent and strain is put on it. For this reason it is as well to tie at least two reef knots.

The following figures [1] show the fracture and wide separation, before operation, of the fragments of the patella of a man of about forty, who was admitted under my care to Leopold Ward last August. He had broken the bone by indirect violence. The fragments were exposed and united by a strong silk. The torn lateral expansions of tendinous and fibrous tissue were then sutured with silk. The condition, found six weeks after operation, is shown in the next illustration. The man has an excellent knee, the union between the fragments is by fibrous tissue, the fragments are approximated. Moreover, the tilting of the lower fragment so that its broken end looks forward, so well seen in the first skiagraph, has been completely corrected.

The following case is also an example of an excellent clinical result obtained by the use of silk to suture the fragments of the patella. The subject, a woman of 45, was admitted under my care to St. Thomas's Hospital, August 1907. She had broken her patella by indirect violence at about the junction of the upper quarter with the lower three-quarters, which shows that it was done when the knee was fully flexed. The patella was sutured with a strong silk, the fragments coming well and easily into apposition. The skiagraph, taken some months after the operation, shows that, to all appearances, bony union has occurred between the fragments, such as is more likely to result with fractures in the upper than in the lower part of the bone. The woman has as good movements and as much strength in the knee as she had before the accident. A very excellent result obtained with a silk suture, showing definitely that the result of applying internal splints to a fractured patella depends on the approximation of the fragments, and not upon the material of which the splint is made. It is desirable to point this out, as a kind of fetish has developed around the use of the wire to unite broken bones. It should be added that the lateral expansions were sutured as well as the fragments of the patella.

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[1] See note on page 513.

The next figure is reproduced from a communication made to the *Correspondenzblatt zur Schweitzer Aerzte*, in 1905, upon the subject of refracture of the patella. It shows very well that the wire used to bring together the fragments has become quite loose, although to all appearances bony union has taken place between them.[1]

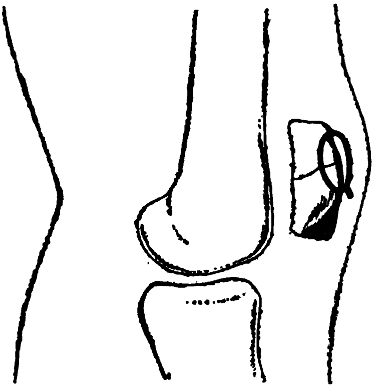

Fig. 9.—*From a skiagraph in which apparent bony union resulted from wiring a broken patella. Note the slack wire.*

Study of the results of suturing fractures of the patella have demonstrated the following points :—

1. That internal splints lead to absorption of the hard substances of the bone round them.

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[1] From a case of the author's used by Dr. Lauper of Interlaken to illustrate his paper.

2. This leads to the loosening of the internal splint, and therefore more easily to its breaking with a sudden effort; and to some separation of the fragments.

3. With the early practice of massage and movements, the fragments are still further separated, and the union between them is fibrous, not bony.

4. A perfectly good functional limb is obtained with such a fibrous union. Bony union is quite unnecessary to an excellent result.

5. Limitation of movement, after the fracture, is caused by the adhesion, or cicatricial contraction of the attachments, of the patella to the femur, putting the quadriceps femoris at a mechanical disadvantage.

6. The advantage of direct and internal splintage, suture of the fragments, lies in its allowing movements of the joint to be begun early, preventing any limitation to the movements of the patella on the femur.

7. From the point of view of the subsequent value of the limb, it makes little or no difference whether the union between the fragments is fibrous or bony, provided that the patella moves freely on the femur.

8. It is a matter of indifference as to the nature of the internal splint used; such as silver wire, copper wire, iron wire, or silk. An absorbable suture is not a good internal splint, because its presence will be required for some weeks at least.

9. A wire is always loosened, even if bony union takes place between the fragments.

10. It is not clear that it is better to use two wires than one.

11. Treatment after operation must be directed to getting a movable knee joint, and a patella freely movable on the femur.

12. For success, the operation area must not suppurate.

13. If operation is to be undertaken, it should be done as soon after the accident as is convenient, and before any reparative inflammation has stiffened the torn structures and increased the difficulty in bringing the fragments together and in moving the joint afterwards. Union by first intention can then be obtained between the fragments.

FRACTURE OF THE METACARPAL BONES.

BY JOHN ALEXANDER MACKENZIE, CH.M., M.A., M.B.,
Late Resident Medical Officer, Royal Infirmary, Aberdeen, and Oldham Infirmary, Lancs.

[With Plates VI.—XX.]

HITHERTO very little has been known, and very little recorded, of fracture of the metacarpal bones; but the introduction of X-rays has revealed to us the fact that these fractures were of much more common occurrence than was generally believed to be the case, and left us to assume that many cases, which have been previously diagnosed as contusions and dislocations, were in reality fractures.

Little attention has been given to these injuries, and the scanty literature on the subject, along with the brief descriptions of the surgical treatises and text-books, led Dr. Raymond Russ, in 1906, to make the first complete collection of cases. Before that time all observations had been taken from Hamilton's 10 cases; or from Malgaigne's 16 cases out of a total of 2,377 fractures, or about ·67 per cent. Russ made a collection of 27 cases, and, during the last four years, I have treated 67 cases.

In the series that Russ collected, he says that they occurred in patients ranging from 14 to 63 years of age, while, in the cases coming under my notice, few fractures occurred below the age of 18; but another very important point came under my notice, namely, that separation of the epiphysis under that age was quite common, and I have a series of radiographs taken of the hands of millworkers where the epiphyses were separated, mostly by direct violence, and where crepitus could be distinctly made out. Little is seen on the first glance at the radiograms, yet, on analysis with the hand alongside in all cases, I had not the faintest doubt but that the epiphyses were separated.

Russ also states that the fracture is rare in women, and out of his 27 cases he only got one; Friedreich reports having seen but one case in a female in his entire polyclinic: but my figures compare badly with these, possibly due to the fact that my cases have been gathered from large manufacturing centres, where women are extensively employed. My proportion would be 7 in males to 1 in females.

Most of the cases occur between the age of 30 and 40—the period of greatest strain in life from the physical point of view.

In but one case of his series, did Dr. Russ meet with more than one metacarpal fractured, *i.e.*, the 4th and 5th. My cases have occurred in all fantastic combinations, as many as four metacarpals being fractured at once.

Again, Hamilton says that usually the injury is compound, and "of such a nature as to demand amputation." Now, I find that the proportion of compound fractures to simple ones is as 1 to 30, and I never had recourse to amputation.

CAUSE.

According to Hamilton these bones are "usually broken by direct violence." Now, that is not altogether in accordance with the experience of recent observers, for a careful history of most cases reveals the fact that "indirect violence"—such as a fall—and the force brought to bear in the longitudinal axis, very often causes an oblique fracture between the middle and upper third. The commonest example of this is the case of a blow delivered with the clenched fist, the force being received on the distal end of the bone, and operating in the direction of the long axis. Nine out of 27 of Russ's fractures were caused that way. Lonsdale has recorded a case in which fracture of the 3rd metacarpal was caused by a fall on the end of the outstretched middle finger. The cases of direct violence have been the result of blows from revolving belts, from sticks, from a piece of metal "sparking" from the anvil, or even from a fall on the back of the outstretched hand.

DIAGNOSIS.

Russ says the "diagnosis of metacarpal fracture presents few difficulties:" quite true, provided you get the case early, say, within three hours of the accident; but let the case be seen 24 hours after the accident, when swelling has set in and

PLATE VI.

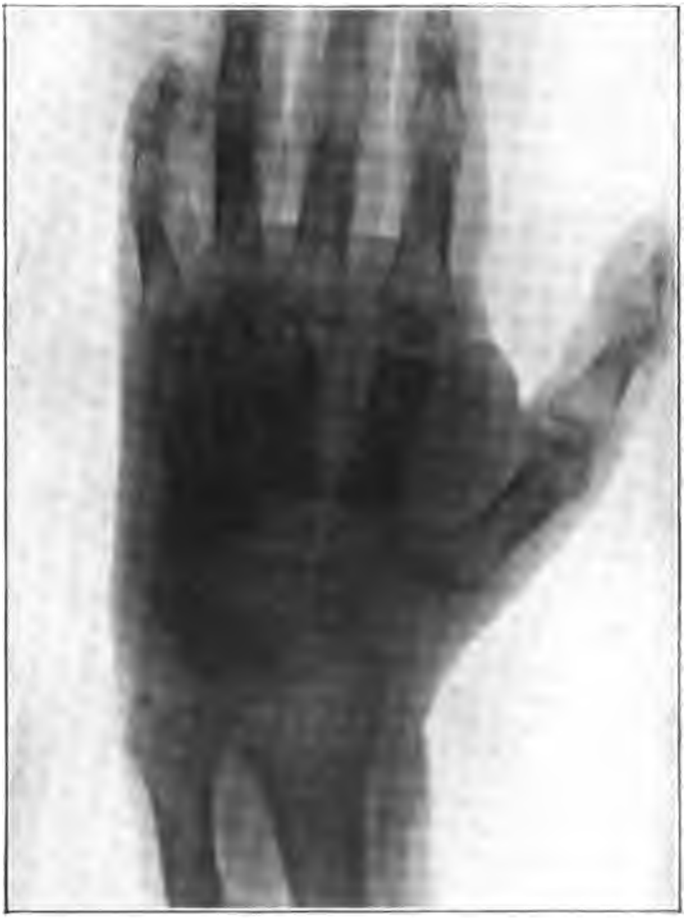

Fig. 1.—*Case of badly treated fracture of the metacarpals.*

PLATE VII.

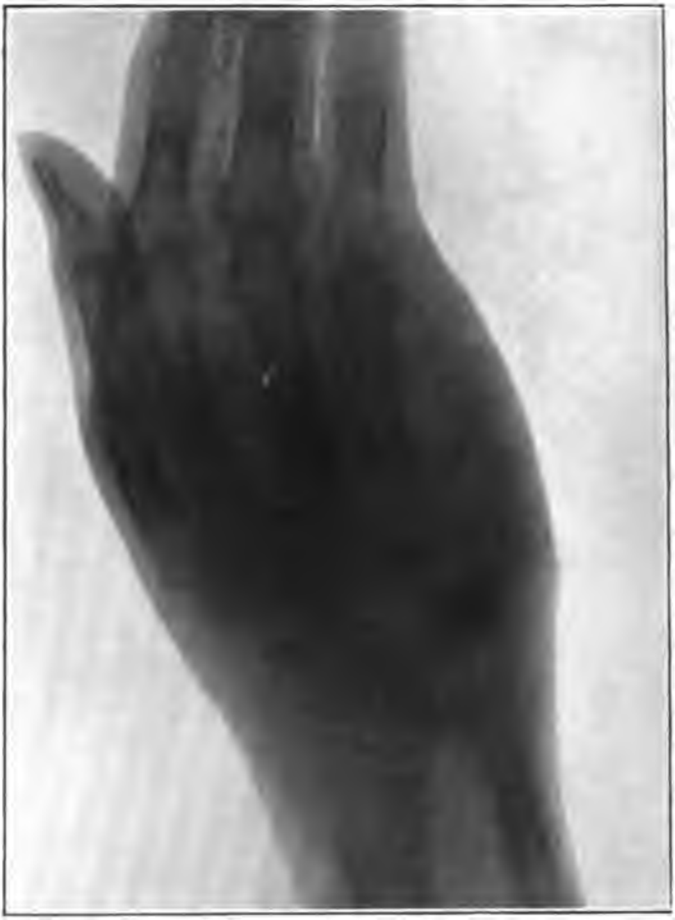

Fig. 2.—*Case of badly treated injury to metacarpals.*

the parts are very tender, then, without the aid of X-rays, the diagnosis is a very difficult matter indeed.

I. *Crepitus.*—This can nearly always be made out, provided you get the patient early enough after the injury; but if you do not see the case till after four hours, and the fracture is of the third or fourth metacarpal, then crepitus is difficult to be got. For obtaining crepitus, the method recommended by Scudder is useful. "Grasp the finger corresponding to the fractured metacarpal with the whole right hand, steadying the injured metacarpal with the left hand, and make steady and continuous traction." This method serves admirably also for reduction.

II. *Unnatural Mobility.*—Much the same is true regarding unnatural mobility as regards crepitus: if you get the injury early, and the fracture is of the first, second, or fifth metacarpal, or the lower third of the third or fourth, then this unnatural mobility is quite noticeable. Separation of the epiphyses gives very marked unnatural mobility of the finger affected.

III. *Displacement.*—Displacement, although very seldom apparent externally, is sufficiently marked to be quite recognisable in most of the cases, and to offer an explanation of the symptoms of functional disability manifested. The metacarpal bones are naturally bent with the concave surface towards the palm, and, when broken, the severed ends are almost invariably displaced backwards, forming a distinct convexity on the back of the hand: the distal end of the distal fragment going forward into the palm, and causing the knuckle of that finger to sink in. This deformity, if not easily seen, is quite easily felt. Mr. B. Cooper explains this displacement as being due to the action of the interossii. The finger looks shorter, and the knuckle usually sinks in out of the line of the rest. Should the head ot the metacarpal be displaced to the median line, the corresponding finger usually points away from it. Sometimes the base of the bone may be involved in the deformity by being displaced backwards, forwards, or to the side.

Lateral displacement of one metacarpal bone leads to secondary displacement of the adjacent metacarpals, and through them to displacement of the whole row. This also affects the position of the carpal bones, straining the carpal ligaments. This displacement, if unreduced, leads to diminished mobility and weakness of the fingers and wrist.

In a few cases, I found the head of the metacarpal bone displaced forward; in which case the corresponding finger cannot be properly flexed, and, if it unites in that position, for some considerable time the patient is unable to maintain his grip of any article. This is explained by Gulebiewski as being due to the pressure exercised by the head of the metacarpal bone thus displaced.

IV. *Ecchymosis.*—Ecchymosis is often absent, and when present is most noticeable in cases, in which the 1st and 2nd metacarpals are involved, appearing in the interspace between these two bones.

V. *Swelling.*—Swelling is usually present, comes on rapidly, and lasts for from five to seven days.

With the exception of the metacarpal of the thumb, it is seldom that the patient himself has any sensation of the bones having snapped, although, in many cases, he can put his finger upon the exact spot where the fracture in the metacarpal exists, as the pain at that spot is very sharp.

TREATMENT.

I shall at this stage take up treatment, and mention the general principles that guided me in this, for, from my point of view, prognosis depends completely on the care adopted in treatment. I took up Prof. Helferich's work on fractures and dislocations, and, turning to fractures of the metacarpals, all I could find on the matter was this: "There is little tendency to displacement, and so the treatment is correspondingly simple," but what this treatment is he does not say.

Hamilton treats the matter at more length. He applies moderate extension, made upon the finger corresponding with the broken bone, and firm pressure behind forcing the fragments home. That is all right, but then he adopts a gutta-percha, felt, or thick cardboard splint to either the whole surface of the back or palm of the hand and fingers, while they are held in a position of easy flexion. Now what does this lead to? He reduces the deformity by extension and pressure, but the method of putting up in the splint does not

PLATE VIII.

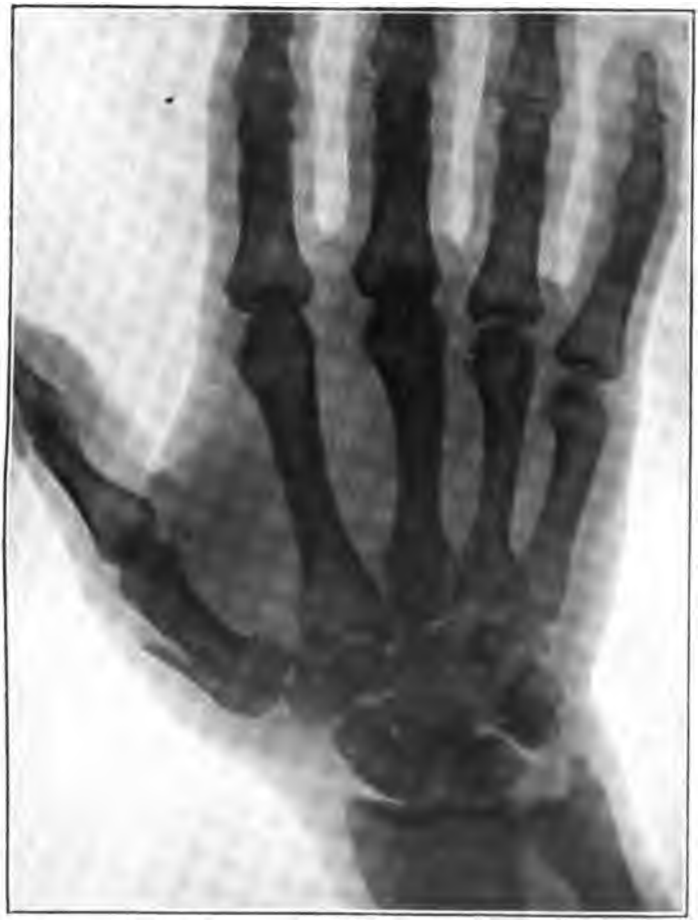

Fig. 3.—*Bennett's fracture.*

PLATE IX.

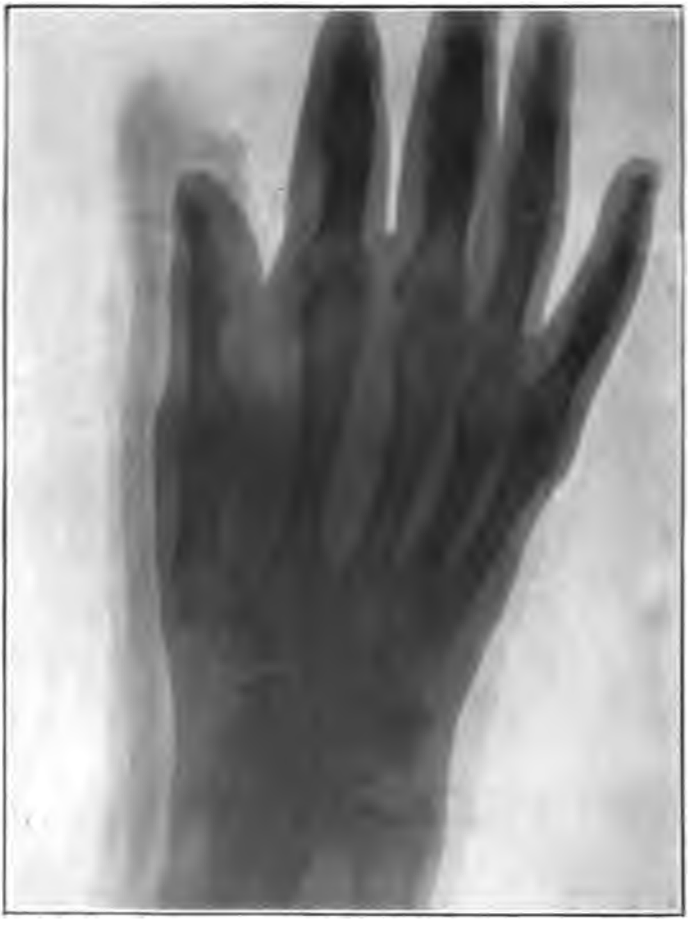

Fig. 4.—*Case of fracture of 1st metacarpal proximal end.*

keep up this extension and retain the fragments in position. Accordingly, by the time the splint has been bandaged on, the fragments have slipped back into their original malposition. I have had the opportunity ot examining numerous cases treated by this method, and the results were anything but satisfactory.

Tillman's method of procedure is much more satisfactory, but yet does not quite meet the requirements of the case. He acts as follows:—"A firm wad of cotton is placed in the palm, and the hand allowed to close over it. A gauze bandage is then applied, and may be strengthened by one of plaster of Paris or waterglass." Now, a wad of cotton is not sufficient. It is not stiff enough, and accordingly the fingers slide into the easiest possible position, which position is not always the most satisfactory. Moreover, one cannot get sufficient extension over a pad of cotton-wool. Russ's criticism of this method is as follows:—"The old dressing—a roller bandage placed in the palm of the hand and the fingers drawn firmly over—has been employed, but has not given uniformly good results. Traction in this method is very unsatisfactory. The pressure exerted is unequal, and posterior bowing of the fractured metacarpal has occurred. Fractures of the 2nd and 5th metacarpals are very inadequately protected by this method, and no attempt is made to correct lateral displacement." His (Russ) method of treatment is as follows:—Slate pencils are placed as co-adaptation splints on each side of the broken metacarpal, two in the palm and two on the back of the hand. These extended from the metacarpal base to the middle of the shaft of the first phalanx. The slate pencils were firmly secured in position by means of two strips of narrow adhesive plaster, passed round the hand.

Small rubber bands were then placed over the projecting ends of each pair of slate pencils, so that they would press quite deeply into the interosseous spaces. The dressing was then completed by making traction forcibly upon the finger, and maintaining this traction by means of an adhesive strip wrapped firmly about the finger and the projecting ends of the four slate pencils. Cotton was then placed between the fingers and about the tips of the slate pencils, to prevent rubbing, and the dressing completed by a posterior splint of wood.

This dressing, Russ says, is applied with considerable difficulty to the second metacarpal, but very easily to the third or fourth. For the first and fifth, it is modified by employing two pencils placed in the interosseous space, and one placed laterally, while dressings of the thumb should be reinforced by the internal rectangular splint.

The dressing, recommended by Carl Beck, in *New York Medical Journal*, August 1900, has been used with good results in cases in which traction was not necessary. This consists of a co-adaptation splint made of short pieces of drainage-tube of moderate size, applied on each side of the fractured bone on the dorsum of the hand, and held in place by a strip of adhesive plaster.

Where this is of most service no traction is needed, but, unfortunately, most of the cases require traction, and, working from that point, the following is the method which I have found gives the best results, and is at the same time simplest of application. A round handle of wood, fitting the breadth of the hand and of uniform thickness, is selected. The diameter of this piece of wood depends on the size of the hand you have to deal with, usually 1½ inches in the case of an ordinary workman. This is swathed in cotton-wool, dusted with boric powder, and applied to the hand, which has been previously thoroughly cleansed and disinfected. The mode of application is as follows. The patient is made to grip this handle of wood firmly, and by doing so he puts powerful extension on the distal fragment, while a small pad of lint is put on the dorsum of the hand, forcing the fragments into position. The hand is kept in that position and the extension kept up by long strips of adhesive plaster, which come down from above the wrist on the dorsal aspect of the hand, following the line of the extensor tendons; these are button-holed over the knuckles to adapt themselves to them, and, firmly binding down the fingers in position, are carried up the palmar aspect of the hand and wrist. The hand, swathed in cotton-wool, is bandaged in this position. If there is much swelling the bandage is re-applied on the 4th day. On 6th—8th day, according to the nature of the case, the dressing is taken down, but the patient not allowed to move his fingers himself. Passive movement is done and a

PLATE X.

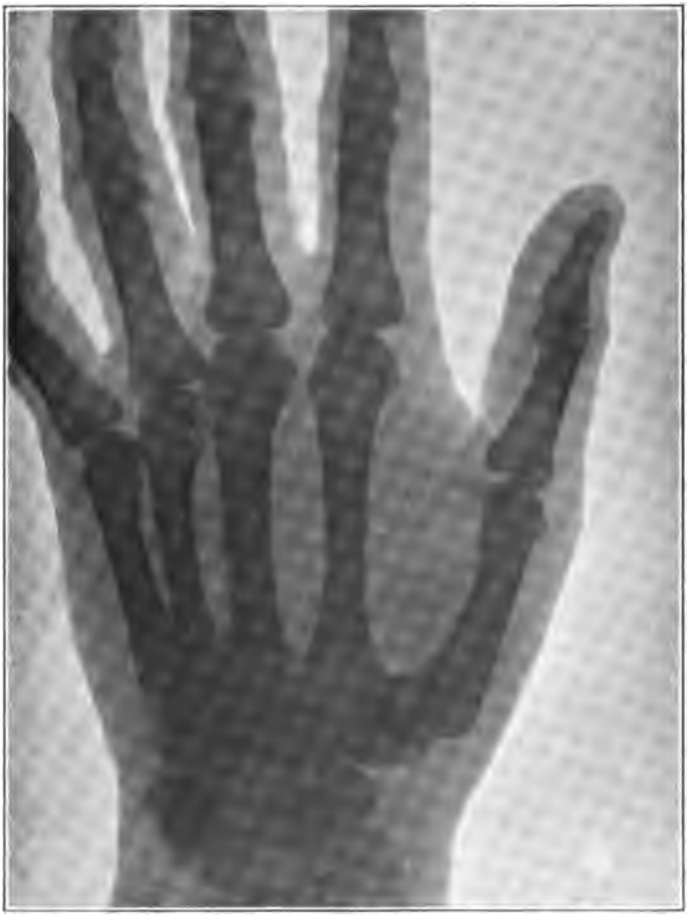

Fig. 5.—*Fracture of 1st metacarpal proximal end going into the joint.*

PLATE XI.

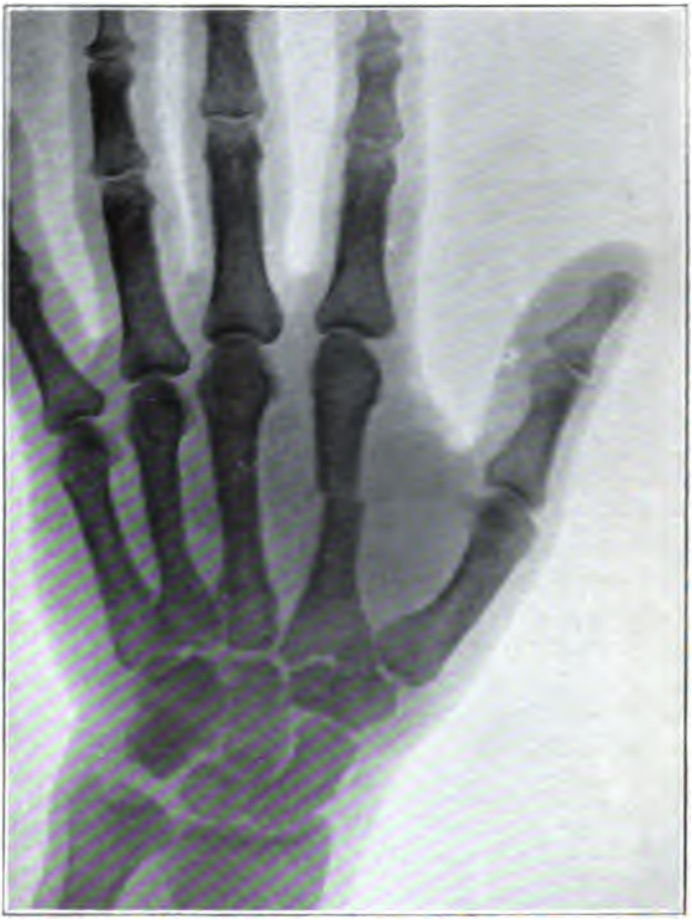

Fig. 6.—*Fracture of index metacarpal after two days' treatment, showing the position of broken ends of the bone.*

little massage. Every 2nd day up till 14th day, this is repeated, at which time active movement may be allowed, and from 21st—28th day, according to case, splint can be discontinued, and hot baths and massage resorted to. Following out this *régime*, my results have been extremely satisfactory.

Fractures of the first metacarpal require a slight modification of this. In these the distal end of proximal fragment is displaced usually backwards and outwards, due to the action of the extensor ossis metacarpi pollicis, while the proximal end of the distal fragment is pulled inwards and forwards by the flexor ossis metacarpi pollicis and the adductor transversis. The same rounded splint is used, but is made to fit into the interosseous space between the thumb and index, and the point of the thumb flexed over it and fixed in that position. This puts extension on the distal fragment, and forces it outwards and backwards, while the proximal fragment is pressed inwards by a pad and fixed in that position by adhesive plaster. The hand is bandaged as before, or put in plaster of Paris, and the same after-treatment carried out.

PROGNOSIS.

If seen early and properly treated, the prognosis as to the usefulness of the hand and deformity is very favourable; but, on the other hand, if left alone, or badly treated, the prognosis is very bad. This fact was impressed on me very forcibly by reading Gulebiewski's treatise on diseases caused by accidents, where he cites case after case, in which the usefulness of the hand was permanently impaired by badly treated metacarpal fractures; and I have seen several cases myself in which, especially after compound fractures, the tendons have become adherent and glued down to a mass of callus, and the resultant hand has become nothing better than a claw.

Example :—Case of G. S., æt. 25, received a crushed hand in October 1902; the second, third, and fourth metacarpals were broken at their bases, while the distal end of the third was also snapped off. The hand suppurated, and that, together with immobilisation for eight weeks, rendered it quite useless. The patient came to me, in August 1904, with the hand as stiff as a poker; the only movement he could effect was that of slight flexion of the last two phalanges, the extensor tendons were firmly glued to the back of the hand, on which a mass of callus projected, with complete ankylosis of carpo-metacarpal and metacarpo-phalangeal joints. I advised an anæsthetic, and an attempt to break down the adhesions, but he refused to have anything further done. I was, however, allowed to take a skiagram of the hand, which I append. (*See* Fig. 1.)

Another case, that of a hand crushed between two waggons three years before I saw it, is also worth recording. The little finger had been amputated at the time close to the attachment of the carpus; the third and fourth metacarpals had been broken at their junction of the upper third with the lower two-thirds, and the carpus injured; necrosis of carpus and metacarpus followed. The hand had been repeatedly curetted and kept on a straight splint, as long as three months at one stretch. This treatment, along with suppuration, had left the fingers and hand one stiff mass, with only slight movement of the distal phalanges possible. This man also refused any further treatment, but allowed me to take a plate of his hand. (*See* Fig. 2.)

The study of cases like these led me to some observations on the results of these fractures. Should fractures of the head or base of the bone be accompanied by lateral dislocation, the bone usually becomes fixed in that position, and, accordingly, the deformity becomes of serious functional importance. It sometimes also happens that the base of one metacarpal becomes broken off and driven between the adjacent metacarpal and the carpus, while the head of the bone becomes united with the same metacarpal on the opposite side. As a result of this, the hand is broadened and the fingers considerably displaced. This usually occurs in cases in which the hand has been crushed between cog-wheels or rollers. Fracture of the head of one metacarpal, involving the joint and including the corresponding articular extremity of the proximal phalanx, is usually followed by ankylosis of the mid-phalangeal joint, as well as ankylosis of the metacarpo-phalangeal joint, causing the affected finger, or fingers, should several be involved, to become fixed in flexion, and thus, to a great extent, impairing the usefulness of the hand. The mobility of the adjacent finger, or, in cases involving the thumb or fourth finger, of adjacent fingers, is, as a rule,

PLATE XII.

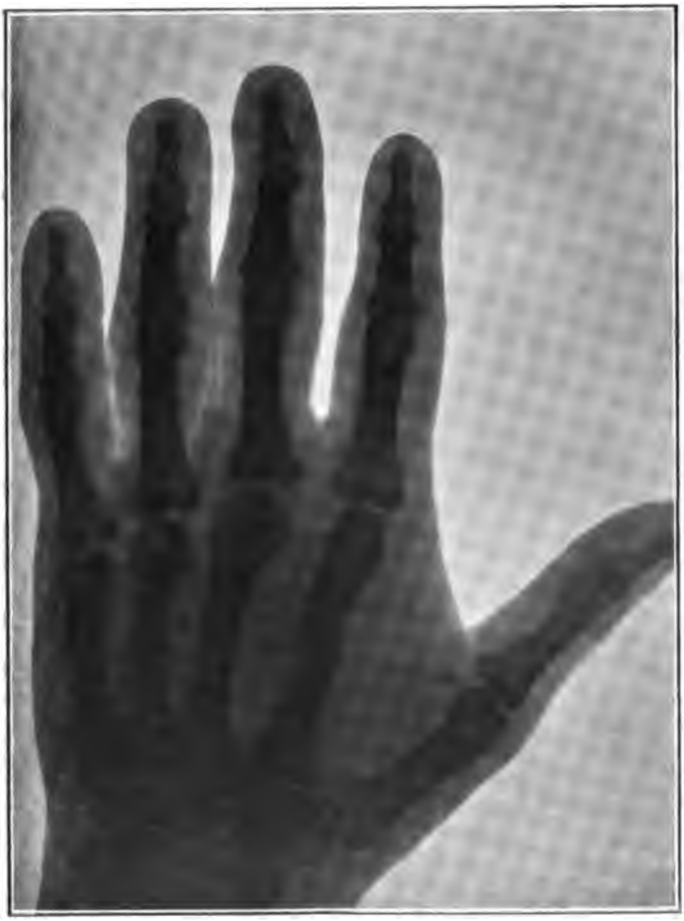

Fig. 7.—*Fracture of index metacarpal due to kick from a horse.*

PLATE XIII.

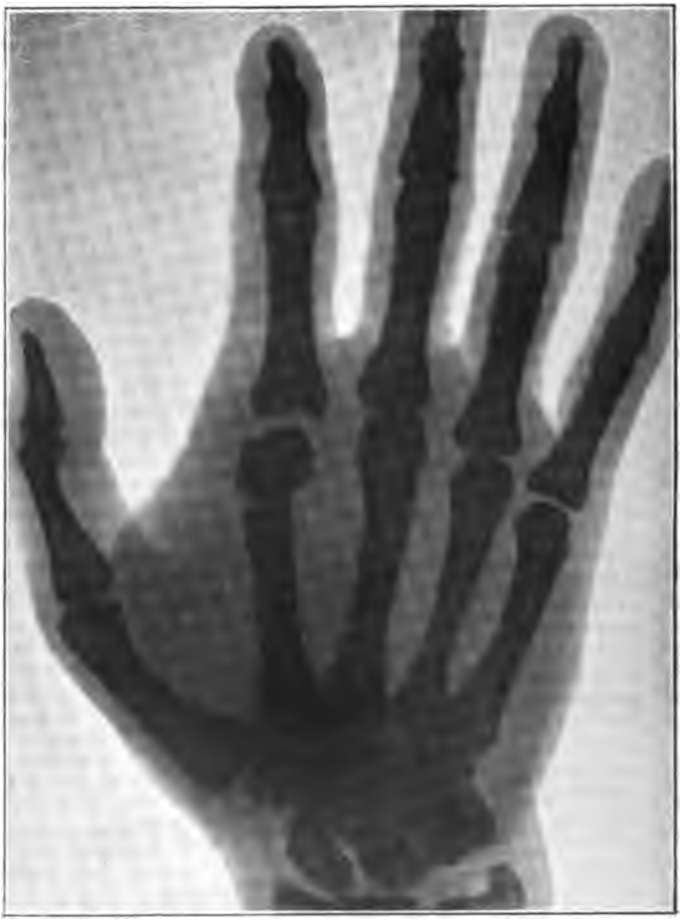

Fig. 8.—*Compound fracture of distal end of index metacarpal.*

secondarily affected; so that the hand can be only partially closed.

Fracture of the first metacarpal sometimes leads to primary atrophy of the ball of the thumb and secondary atrophy of the ball of the little finger, the reverse holding good for fracture of the fifth metacarpal. In addition, there is often atrophy of the interossii, accounting for the weakness and functional disability of the whole hand, even should no other complication exist to restrict its power.

Fracture of the second metacarpal may lead to primary atrophy of the first, second, and third interossii, limiting the power of flexion of the index finger, and, to a certain extent, that of the thumb and the little finger as well. A similar effect may be got by fracture of the fourth or fifth metacarpals; and, in cases of fracture of the third, the weakness of the hand is a particularly well-marked symptom, since the third finger is normally the strongest. The results shown above, however, are rare, and each case must stand by itself.

SERIES OF CASES ILLUSTRATING FRACTURES OF THE METACARPAL BONES AND THEIR TREATMENT, WITH RESULTS.

I. *Fracture of 1st Metacarpal Bone.*—This fracture may be very well styled "punch fracture," as Dr. Burrows styles it in his article in *B. M. J.* of March 28th, 1908, where he records several cases, and, as he does, I find Bennett's fracture very common.

G. S., æt. 34, in a quarrel with his wife on the 29th August, struck her a blow on the jaw with his left fist, fracturing her jaw and the metacarpal of his thumb at the same time. I saw the woman within a few hours of the accident, but it was three days before I examined the man's hand. By that time the back of the hand was considerably swollen, and any attempt to move the thumb caused intense pain. Lead and opium compresses were applied, and the hand put in a straight splint, well padded, for two days. At the end of this time a skiagraph was taken. (*See* Fig. 3.)

The skiagram showed well-defined fracture, with an outward and backward displacement of the upper fragment, which consisted chiefly of the head of the bone, and which was partly dislocated on account of the ligaments being torn. The lower fragment was displaced inwards and forwards, due to pull of the flexors. The fragments could be pressed back into position, but sprang apart immediately the pressure was taken off. The difficulty now lay in devising some method of keeping the fragments together. As the case stood, the thumb was useless, and the function of the whole hand impaired—slight movement giving intense pain.

A rounded piece of wood, shaped like a handle, was padded with cotton-wool and placed in the hand hard up against the interosseous space between the thumb and index finger. The thumb was flexed, and bound in a spiral manner round this piece of wood so that the lower fragment was pressed outwards, and traction was put on the thumb by long strips of adhesive plaster descending in the course of the extensor tendons and over the point of the thumb, crossing transversely the knuckles of the other fingers, and binding the thumb firmly into position. The whole hand was then dusted with boracic powder, enveloped in cotton-wool, and tightly bound up in this position. It was kept thus for seven days, when it was taken down, put into a hot bath for 10 minutes, and passive movement done, and the splint reapplied as before. By this time the swelling had completely gone, as also the pain. The patient was instructed to come back in five days, but he did not do so, and I had given up all hopes of seeing the result, when, about a month afterwards, he was admitted to hospital as the result of an accident, and I had the opportunity of examining the hand. The fracture had united in excellent position, and, with the exception of a fair amount of thickening round the site of fracture, no sign of the injury remained. Movement and power were unimpaired. The history he gave was as follows. Instead of coming to me on the day arranged, he kept the splint on five days longer, then cast the splint aside, and began to use his hand, starting work three days after—exactly 20 days after I had put the thumb in the permanent splint. The result, however, was excellent.

Case IV.—M. S., æt. 30, a cardroom hand, fell in the cardroom and doubled her thumb under her in falling. She was

PLATE XIV.

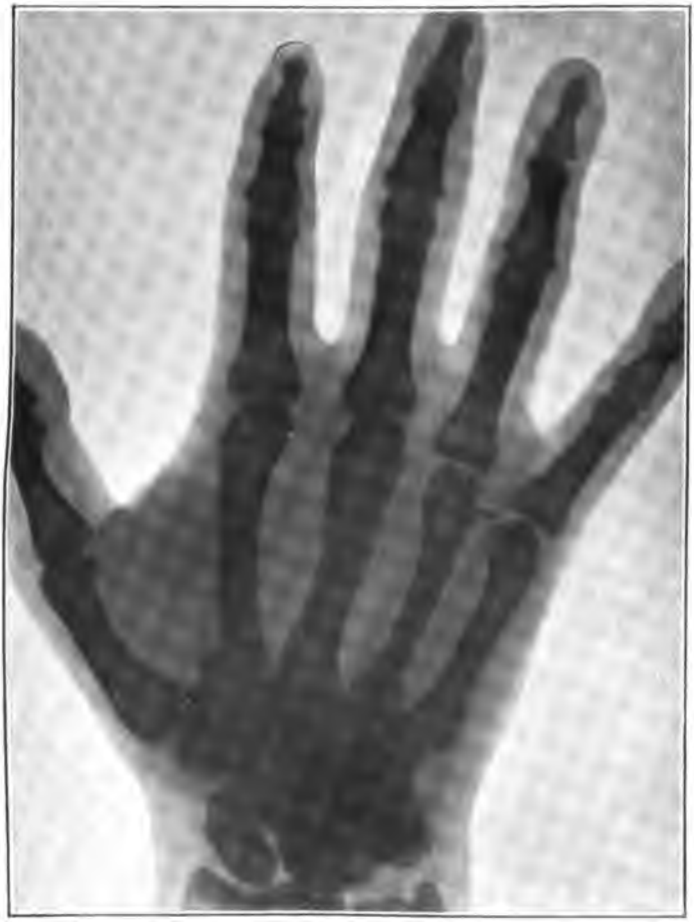

Fig. 9.—*Simple fracture of proximal ends of 2nd and 3rd metacarpals.*

PLATE XV.

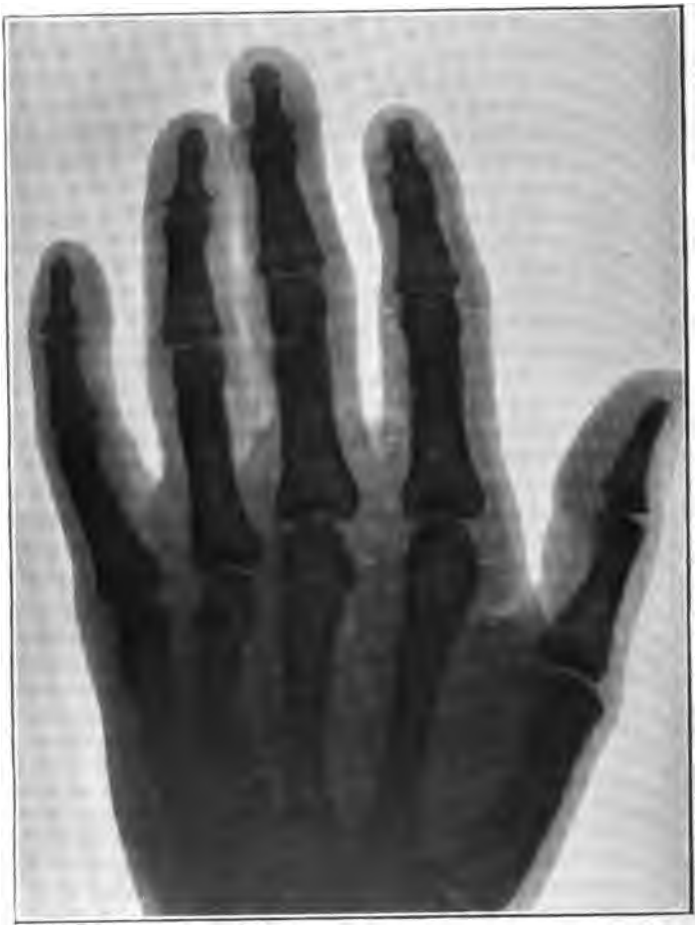

Fig. 10.—*Simple fracture of 4th metacarpal.*

taken to me immediately, and I had no difficulty in diagnosing fracture, but had a skiagram taken—*see* Fig. 4—showing well-marked fracture of proximal end of metacarpal of thumb. The same treatment as in last case was applied, with an equally good result.

Case V.—R. T., a strong, well-built Irishman, was found drunk one night fighting with a wooden wall, and, as his hands were "barked," he was taken to hospital. On examination I found what at first looked like a dislocation of the thumb, but, as his humour was rather argumentative, I bandaged up his hand, and told him to come and see me next day, when I found a chipping off of the articular surface of the proximal end of the 1st metacarpal—a thing, but for the plate I took, almost impossible to discover. (*See* Fig. 5.)

I put him under the same treatment as the others, but the result was not so good, as he used to take off the splint and be without it for a day or two when fancy pleased him.

II. *Fracture of Metacarpal of Index Finger.*—Case of I. W., a minder in a cotton mill, on November 16, 1904, who, while attempting to stop some machinery, allowed a handle fixed on a revolving wheel to strike the back of his hand with considerable force. I saw him within an hour of the accident: the dorsal surface of the hand was swollen, but no visible solution of continuity of the skin. The movements of the thumb, ring, and little finger were perfect, but he had intense pain when any attempt was made to move the index or middle finger, and the pain was all referred to the middle of metacarpal of index finger. The line of the knuckles was also higher up in the case of the index finger than should be. I padded a round handle of wood sufficiently large to completely fill the palm, and when this handle was grasped, extended the index finger over this, and fixed it in position with strips of adhesive plaster, coming down on the dorsum of the hand from above the wrist over the finger and up on the palmar surface of the wrist. Two days afterwards I had the hand skiagraphed—*see* Fig. 6—showing a transverse fracture across the centre of the second metacarpal. In four days all the swelling had disappeared, and in 12 days, passive movement was begun. By the 18th day, splint discontinued, active movement, hot baths, and massage being persisted in, and on the 24th day the man went back to work. The hand in movements, and, to all outward appearances, seemed perfect, but, on running the finger along the border of the injured metacarpal, one came to a slight ridge of callus, showing where the fracture had been.

Fig. 7.—*Case of Simple Fracture of Index Metacarpal due to kick from a Horse; Fracture in the Middle of the Bone.*—Treatment and result similar to the last case.

Fig. 8.—*Case of Compound Fracture of Index Metacarpal at Distal End.*—G. M., æt. 28, was struck on the back of the left hand by a piece of sharp metal flying off from the anvil in one of the large ironworks. The force must have been considerable, for it inflicted a longitudinal cut 1½ inches long, along the radial border of the dorsum of the index metacarpal, going through skin, faciæ, missing the tendon, and smashing off the distal end of the metacarpal, ½ inch above the metacarpo-phalangeal articulation, and twisting the finger so, as to give it the look of dislocation also. The proximal end of the distal fragment could be felt projecting in the wound. The hand was very dirty, covered with iron dust, oil, etc., and bleeding very freely. Patient refused any anæsthetic, local or general, so I had to clean it as best I could. I did so, and then stitched it up on the off-chance of having rendered it aseptic, skiagraphed the hand, set the fracture, and put the hand up the same as the others. Four days afterwards, as the stitches showed slight signs of suppuration, I removed them and washed the wound out with hydrogen peroxide. In 14 days the wound had closed, and passive movement was begun in order to prohibit adhesion of the tendon to the scar. The hand was kept other 7 days on the splint, then active movement, massage, and hot baths were commenced. In a month he could use his hand freely, but as he was a hammerman, and his work heavy, I kept him off work another fortnight, and then advised him to wear a glove on his hand for some time. Two months afterwards, I saw the hand, and, with the exception of slight thickening at site of fracture, the result was perfect.

III. *Simple Fracture of the 2nd and 3rd Metacarpals.*—

PLATE XVI.

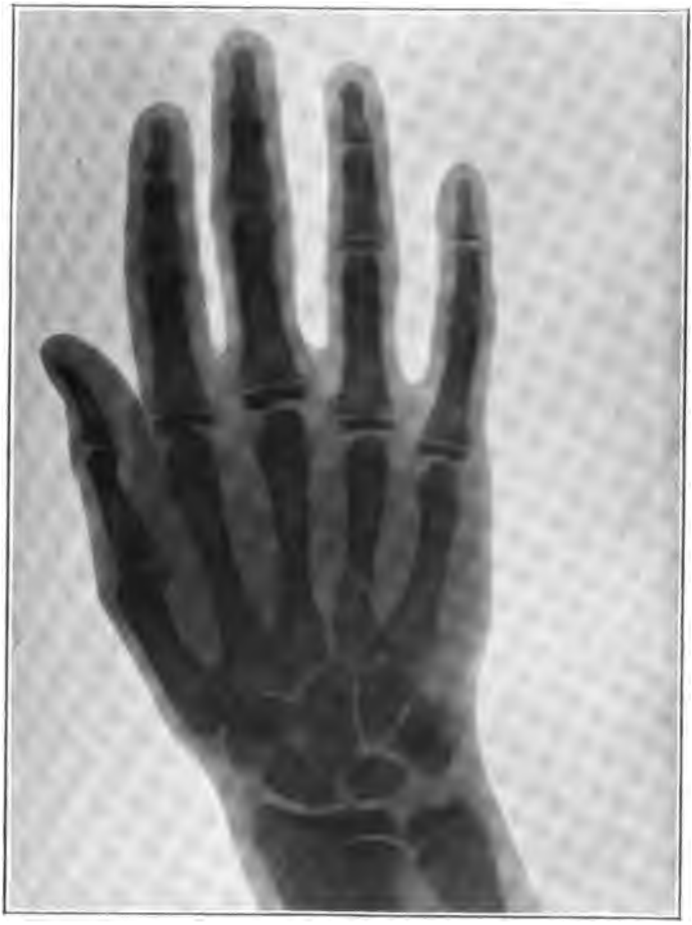

Fig. 11.—*Simple fracture of 4th and 5th metacarpals.*

PLATE XVII.

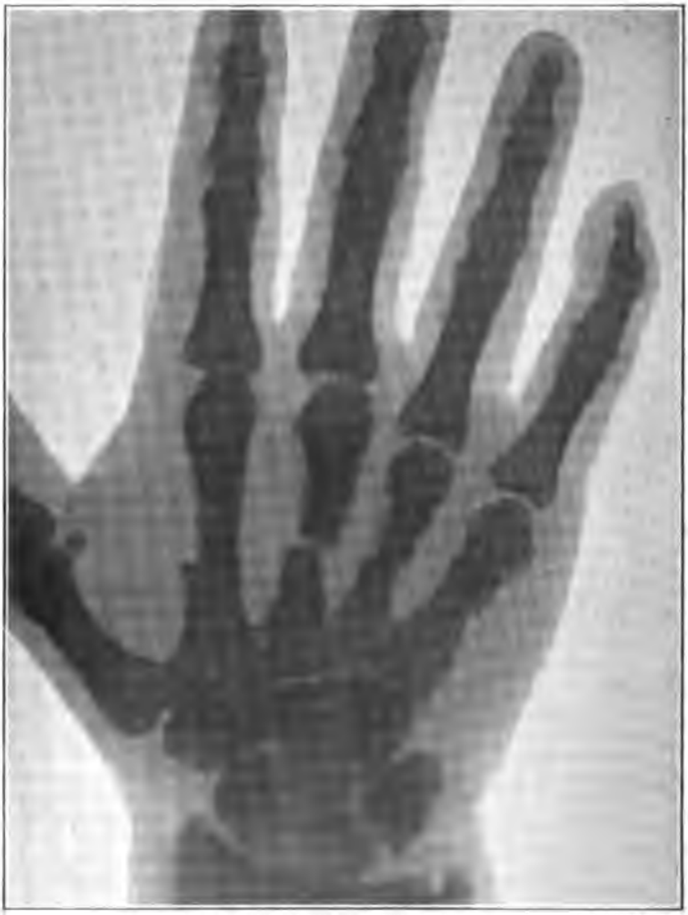

Fig. 12.—*Simple fracture of 2nd, 3rd, 4th, and 5th metacarpals, taken immediately after the accident.*

Case of Wm. T., æt. 33, cotton operative, who, while shifting a belt in a mill, was struck by the revolving belt buckle on the back of the left hand. I saw him two hours after the accident. There was no external injury. The dorsum of the hand was swollen and very tender; the movement of the thumb was free, but that of the other fingers caused intense pain. There was no deformity beyond the swelling, and I must say I did not suspect fracture. Compresses of lead and opium were applied, and next day I skiagraphed the hand, revealing fracture of the second and third metacarpals at their proximal end—*see* Fig. 9—and on careful examination, after seeing the plate, this was a simple thing to see, but I must confess I should have blamed no one for passing it over. I treated this case the same as the others, and, with the following exception, the result was excellent. More callus was formed, and the extension of the fingers (index and middle), at the end of one month, was half an inch limited from the normal at the point of the fingers. I expect this limitation would pass away in time, but I lost sight of this patient and cannot say for certain.

IV. *Simple Fracture of 4th Metacarpal* (*see* Fig. 10).—Case of H. F., æt. 36, cotton operative, who got his hand jammed in the machinery of the cardroom. I saw him within an hour of the accident: back of the hand swollen, but no solution of continuity of the skin. The swelling was mostly on the ulnar side of the dorsum of hand, and the knuckle of the 4th finger was sunk out of line. In this case, one could find all the usual classical symptoms of fracture, with both the fractured ends projecting backwards, but very easily pressed into position. I put this hand up in my usual method, but added a firm pad over the fracture to keep the ends of the bone from springing backwards. Four days afterwards I examined the hand with the fluorescent screen, and found the fracture in excellent position. I attempted then to take a plate, but the thickness of the cotton-wool and wooden splint, and the multiplicity of the shadows, although the plate showed the bones fairly well, made it too indistinct to give anything like a good print.

Passive movement was begun in a fortnight, splint discontinued at the end of three weeks, and, on the 27th day, the man was back at work, no impairment whatever resulting.

V. *Simple Fracture of 4th and 5th Metacarpals.*—Case of H. H., æt. 17, a cotton spinner, who, while making a rush to get out of the room at the dinner hour, fell, and, in an attempt to save his head from striking the corner of the wall, doubled his hand under him. Three hours afterwards he came to see me with the back of his hand very much swollen, and unable, without the greatest pain, to move the ring and little finger. The swelling and tenderness were mostly confined to the ulnar border of the hand, and pressure over the knuckles of 4th metacarpal gave intense pain, referred to the junction of the middle with upper third of these two metacarpals. In short, all the classical symptoms of fracture were present, and I treated it as such. After the hand had been up four days in splints, I took a plate—*see* Fig. 11—showing the fractures in excellent position. This was an excellent example of an indirect force applied on the ends of the bones causing them to give way at their weakest part.

The after-history was uneventful, the boy going back to work on 24th day, and, a month later, no trace of the injury could be found.

Simple Fracture of Distal End of 5th Metacarpal.—H. B., æt. 18, a little piecer, while carrying a hamper of reels, was struck on the knuckles by a revolving shaft. I saw him in the evening, six hours after the accident. No wound existed, but the dorsum of the hand over the fourth and fifth metacarpals was much swollen, and the head of the fifth metacarpal very tender. Crepitus and the usual signs existed, and, on taking a skiagraph, I found fracture existing where epiphysis joins shaft. Unfortunately, I broke this plate lately when printing, and am unable to give a print of the case. The case went on uneventfully, and healed with very little callus formation, a thing which is very typical of fracture near an epiphysis in the earlier years of life.

Simple Fracture of 2nd, 3rd, 4th, and 5th Metacarpal Bones.—G. L., æt. 28, an engineer, while lowering a metal beam, came by the following accident. The chain, holding up the beam, broke, and came crash down on the back of his hand, which was at that time tightly clasping a rope. The weight falling on his hand he computed at 70 lbs. I saw

PLATE XVIII.

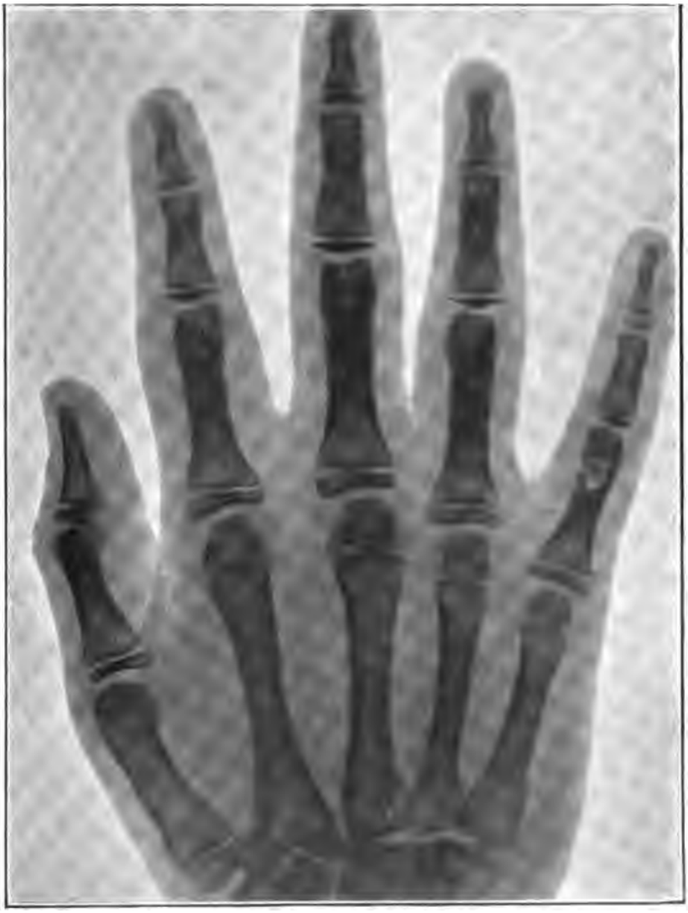

Fig. 13.—*Separation of 3rd, 4th, and 5th metacarpal epiphyses.*

PLATE XIX.

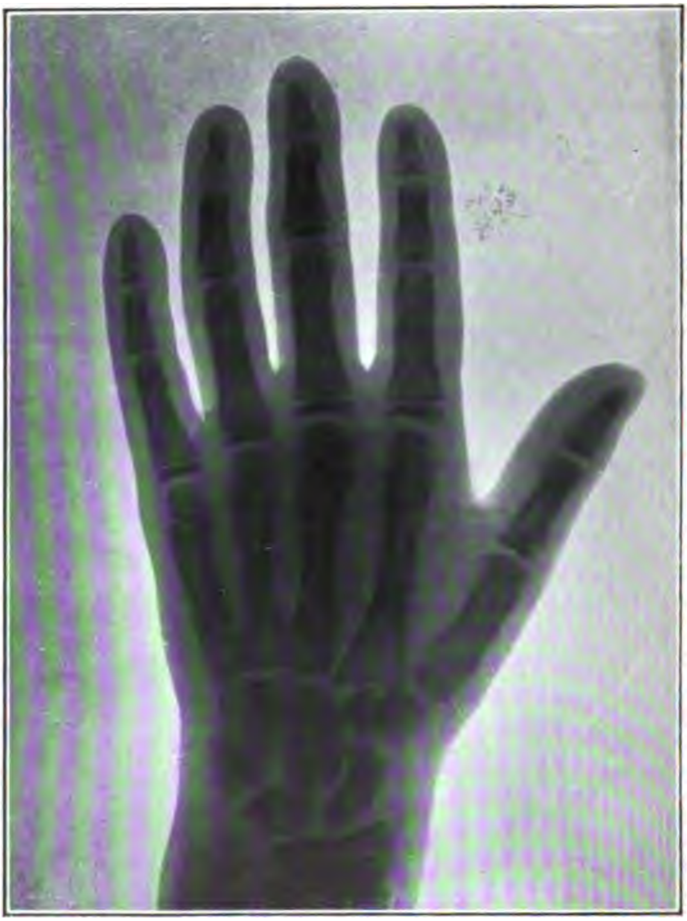

Fig. 14.—*Separation of the epiphyses of 3rd and 4th metacarpals.*

him in about an hour after the accident, and, besides a few scratches and swelling, no deep or severe wound existed; but all the cardinal symptoms of fracture were there, although of how many bones I could not then say. Accordingly, I cleaned the hand, and had it X-rayed, showing fracture at the centres of the 2nd, 3rd, 4th, and 5th metacarpals. (*See* Fig. 12.) I put the hand up in the usual manner, the fingers extended in a flexed manner over an unusually well-padded splint, and fixing the fingers with strips of plaster. I used a large amount of cotton-wool in bandaging up the hand for the elastic pressure, and, by the tenth day, all traces of swelling had disappeared, and hot baths, gentle massage, and passive movement done. I kept the splint on 24 days, but it was six weeks before I got the proper use of the hand established, and even then he said it was much weaker than the other.

I saw the patient three months after the accident. No deformity whatever resulted, and he said the hand was now as good as the other.

THREE CASES SHOWING SEPARATION OF THE EPIPHYSES OF THE METACARPALS.

I. *Separation of 3rd, 4th, and 5th Metacarpal Epiphyses.*—Florrie H., æt. 17, a cardroom hand, allowed her hand to get caught between two rollers, crushing it severely. I saw her, and had a skiagram taken before an hour had elapsed or much swelling set in. The fingers were slightly bruised, but what struck one most was the mobility of the knuckles of the 3rd, 4th and 5th metacarpals. All the cardinal signs were there, except crepitus. The slightest tap on the point of either of these fingers gave her intense pain, referred to a spot corresponding with the epiphyseal line. A careful examination of the plate (*see* Fig. 13) and the hand side by side made fracture indisputable. The hand was put up in the ordinary way, and ran an uneventful course, the girl going back to work on the 26th day after accident, at which time distinct callus formation could be made out over the site of each separation.

II. Case of Fred R., æt. 15, little piecer, who was struck on back of the hand by a belt which flew off from its pulley. He did not see me for some hours after the injury, and the hand was very much swollen when examined. No crepitus was evident, and I did not suspect fracture, so applied lead and opium compresses. On the 4th day after the accident, as the swelling had gone down, I examined the hand carefully, bringing out intense pain at junction of 3rd and 4th epiphyses with their respective bones. A skiagram was taken (*see* Fig. 14) and the diagnosis then made absolute. The hand was put up as usual, and, on 18th day, splint discontinued. The boy was back at work on the 25th day with perfect use of his hand, but distinct callus formation at the sites of fracture.

III. *Compound Separation of Epiphyses of 3rd and 4th Metacarpals.*—Wm. D., æt. 15, but looking more, an iron-worker, got his hand fast in a plating machine. He says that, at time of the accident, there were two cuts over the knuckles of the 3rd and 4th metacarpal bones, but he did not pay much attention to the injury, and was dressed by the local ambulance man. About 14 days after the accident he came to see me. Then I found two suppurated sinuses over the respective epiphyses of 3rd and 4th metacarpals. Passing a probe down these sinuses, in both cases I could get it between the fractured ends of the bones, rendering diagnosis absolute. All the other classical signs were present, but the hand was very badly swollen and inflamed, and discharging pus freely. I had a skiagram taken (*see* Fig. 15) and after a week's energetic antiseptic treatment, I got the sinuses to close up gradually. Twelve days after I saw him first, the hand was doing very well, and passive movement begun, and everything pointed to a good result; but, unfortunately, the patient disappeared, and has not been heard of since.

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PLATE XX.

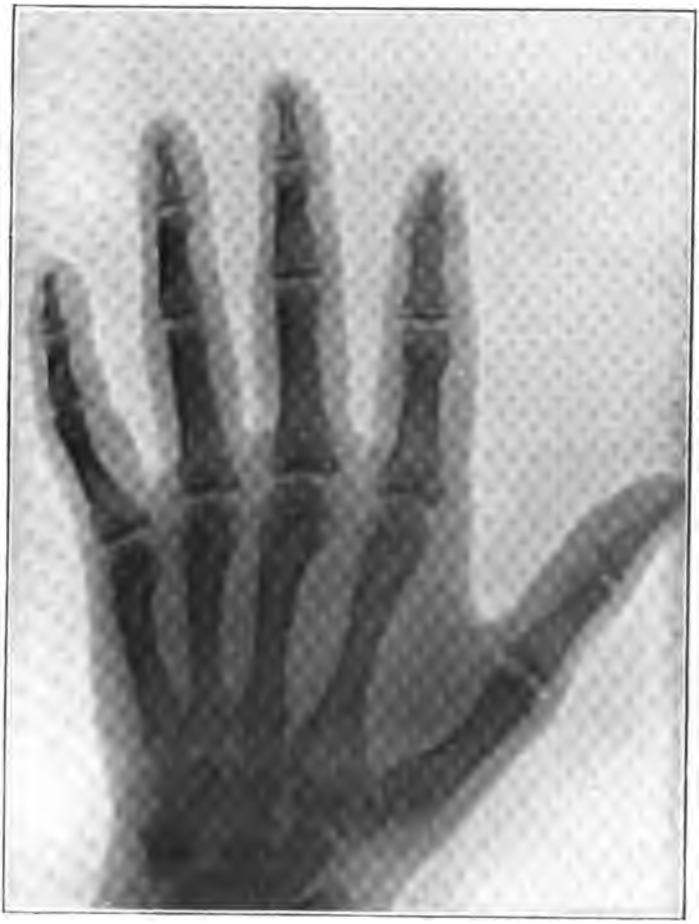

Fig. 15.—*Compound separation of epiphyses of 3rd and 4th metacarpals.*

A NOTE ON THE NECESSITY FOR END-TO-END APPOSITION IN FRACTURES OF LONG BONES.

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[With Plates XXI.—XXII.]

THE renewed prominence given of late to this most interesting and important branch of surgery warrants an extended examination of the situation from all points of view, in consideration of the widely divergent opinions held by many of our most eminent surgeons.

In opening, I would enter a plea for systematic investigation into a subject, in which very little progress can be expected by other than painstaking and careful enquiry, unbiassed criticism, and, most important of all, practical experience of the different methods of treatment under consideration. Some claim to the last induces me to bring forward a few points bearing on the subject, for the views expressed are the outcome of experience in the various methods of treating these fractures.

That arguments based on the fear of public opinion, law courts, etc., should be paraded in an academic discussion seems to me deplorable; and I would suggest that, if sound conclusions are to be arrived at, these two aspects of the question must be kept rigidly apart.

THE NECESSITY FOR END-TO-END APPOSITION OF THE FRAGMENTS.

That this result should always be aimed at has been questioned in a recent statement to the effect that "end-to-end apposition is not necessary to the *perfect* function of a limb," and that patients should be informed of this; further, "that disability is often due to injury of soft parts, and *cannot be even remotely affected by the closest and most perfect apposition.*[1]"

I am convinced that statistical enquiry in a large series of cases, along the following lines, would succeed in refuting such a statement by showing that such apposition is desirable in all cases for the certainty of obtaining a useful limb, and absolutely necessary in all, if a *perfect* limb is required.

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[1] Mr. Robert Jones, *Lancet*, March 21, 1908.

(1) *As regards Repair at the Site of Injury.*—It is fair, I think, to compare the healing of wounds of soft parts with the repair of fractured bones, for physiological and pathological processes in hard and soft parts do not differ in any essential details.

The healing of wounds by granulation is comparable with repair of separated fragments by callus; while primary union is desirable in both for similar reasons.

(2) *In soft Parts.*—(*a*) Primary union is quicker and the resulting scar firmer; "weak scars" result from healing by granulation.

(*b*) Diseases of cicatrices arise almost exclusively in scars, the result of union by second intention.

(*c*) "Painful scar" is practically non-existent after primary union.

To apply these three considerations to the repair of fractures :—

(*a*) Union by direct apposition is quicker and firmer than in healing by callus. That the former is true requires the most superficial experience of cases, in which the fragments have been fixed by operation. I will only instance a fracture of the surgical neck of the humerus in a girl, of seven years of age, where there was marked longitudinal displacement, the lower fragment being displaced upwards and inwards on the axilliary contents. In the light of experience, no effort was made at reduction under anæsthesia, while the great difficulties of obtaining apposition, even with open section, illustrated the futility of hoping for anything but wholesale laceration of soft parts from attempts at reduction by extension and manipulation. This child could do her own hair five weeks after operation, and had full use of a perfect and painless limb. Let me contrast one quite common result of conservative treatment. A healthy woman, in the prime of life, sustained a very similar injury, which was treated patiently on recognised lines. At the end of seven or eight weeks, no union had resulted, though there was abundant callus formation. This treatment was being continued, when she passed out of my hands; probably the intervention of soft parts delayed (or possibly prevented) union, but, as no operation was performed, this could neither be proved, nor, if true, remedied.

That the resulting union is firmer when end-to-end apposition is maintained.

Instances of refracture in long bones, at an old site of previous similar injury (exclusive of cases when the bone is primarily diseased), notoriously occur in cases, in which much callus has united the separated fragments.[1] This is not of common occurrence, but, in such injuries, I know of no instance of refracture after accurate mechanical fixation of the fragments by operation.

Further, I have never succeeded in discovering any evidence of *rarefying* osteitis in the neighbourhood of screws, etc., used for fixation, when the bone has been examined by X-rays some months after their insertion. Possibly opinions to the contrary have been based on the examination of cases soon after operation. On no other supposition (except in the presence of sepsis) can I see the grounds for the view that such an osteitis does persist.

(*b*) Excessive and exuberant callus, chondroma, sarcoma, etc., at the site of fractures are comparable with keloid, sarcoma, epithelioma, etc., arising in scars of soft parts. In both cases these result from faulty apposition only. However small the percentage of such diseases may be, the possibility of their occurrence in any patient should be a warning against neglecting to make every effort to secure end-to-end union.

Further disadvantages of callus formation in excess are connected with the involvement of neighbouring structures of importance in the process of repair. Foremost comes the involvement of nerves, and nowhere is this better illustrated than in fractures of the humerus, while to none is the saying more applicable, that prevention (by accurate apposition) is infinitely preferable to the cure.

Fractures of the upper end of the humerus are particularly apt to involve one or more cords of the brachial plexus, if end-to-end apposition is not obtained. Some time ago, I saw a working man, some months after an operation had been performed to free all the cords of the plexus from involvement by callus, and from the sharp lower fragment, in a case of fracture of the surgical neck of the right humerus, similar to the first one reported. The lower end was displaced upwards and inwards, at this time hardly one muscle or joint was of any practical value to him. Has not this man just ground for complaint, when his case is compared with the one first quoted?

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[1] Stanley Boyd: *Treves' Surgery.*

Many of the instances of musculo-spiral paralysis, resulting from fracture in the middle of the arm, have occurred, in my experience, from birth injuries; I have been led to consider these not uncommon—in every case the paralysis is caused by angular or otherwise faulty apposition, the nerve being damaged either by excessive callus formation (common in these cases), or by a projecting fragment. (*See* Figs. 1 and 2.) To await the obvious necessity for freeing the nerve and rectifying the displacement is wrong, for, in addition to the problematical nature of the outlook as regards the nerve, the lower fragment (in the humerus, unlike any other bone) always becomes unusually brittle, thus adding greatly to the difficulties of a secondary operation. Paralysis of the musculo-spiral nerve, resulting from fracture at the elbow joint, is common enough to be within the experience of all; while the difficulties and uncertainty of cure, when once wrist drop has supervened, are such that all must agree to the desirability of its prevention by ensuring accurate apposition.

Again, in fractures near or into joints, can the statement that end-to-end apposition is unnecessary to the *perfect* function of the limb pass unchallenged?

Such an attitude will be unequivocally condemned by the following brief consideration:—

Limited mobility at the elbow joint in separation of the lower epiphysis is of the commonest occurrence, and is due to two main causes:—

(1) In those cases, in which backward displacement of the epiphysis is very marked, limitation of flexion is caused by the forward projection of the lower end of the shaft, while extension may be unimpaired. I

PLATE XXI.

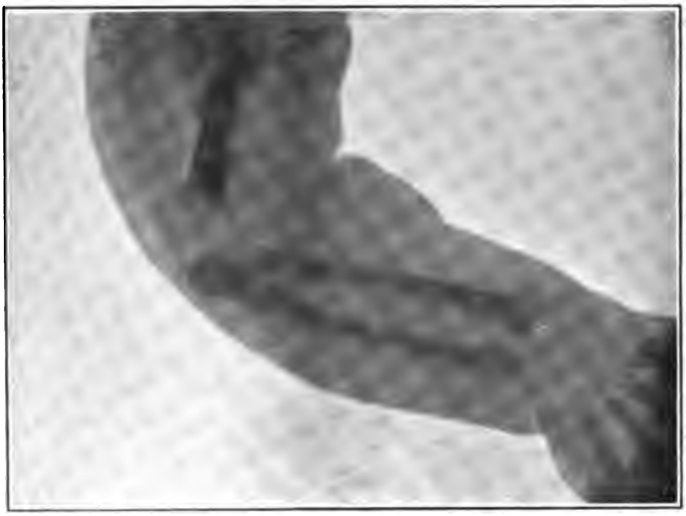

Fig. 1.—*To illustrate paralysis of the musculo-spiral nerve by involvement in excessive callus resulting from faulty apposition and movement.*

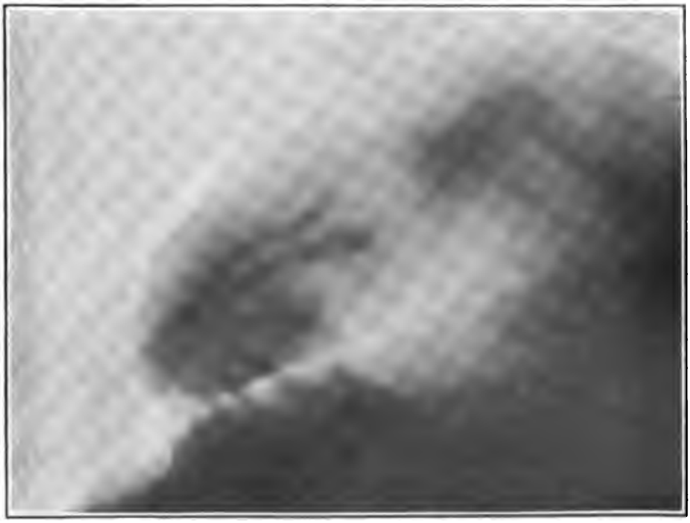

Fig. 2.—*To illustrate paralysis of the musculo-spiral nerve by a prominent angle of bone.*

PLATE XXII.

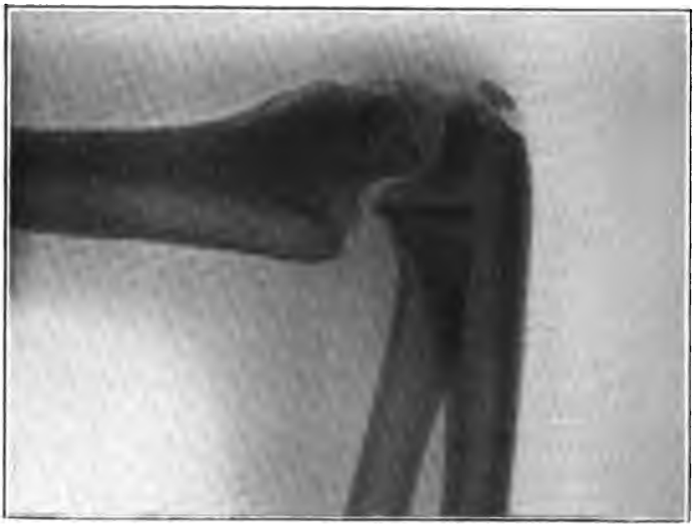

Fig. 3.—*To show limitation of flexion of the elbow joint, with unimpaired extension, from failure of apposition.*

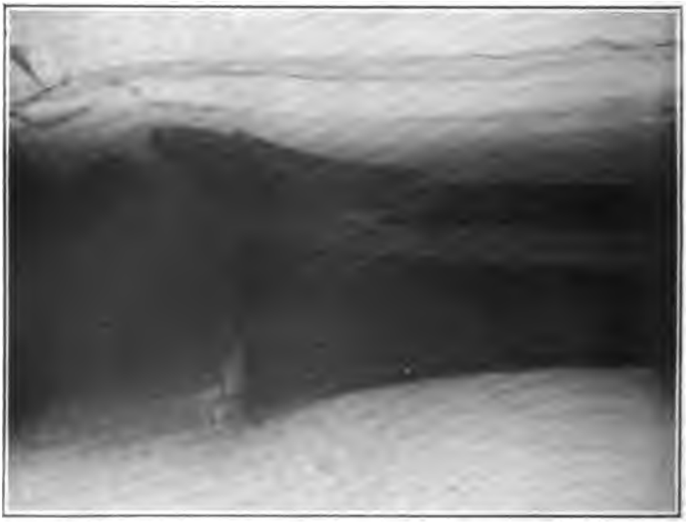

Fig. 4.—*To illustrate deflection of body weight to the inner side of the astragalus from fractures in the lower limb with faulty apposition of fragments. Though the fracture is a rare one, the photograph is only intended to show a common deformity which is frequently met with. Numerous attempts at reduction under anæsthesia were made without success.*

have quite recently seen such a case, when, many months after the accident, flexion was still limited to 90°. (*See* Fig. 3.)

(2) In the second class of cases, in which the displacement is not so marked, but, in which, nevertheless, apposition of the raw surfaces is not obtained, or again, in which the fragments *appear* in apposition, but between them intervenes periosteum or other soft tissues (only to be discovered by open section), it will be excessive callus, or bony production, which will limit both flexion and extension to a marked degree, and perhaps paralyse the musculo-spiral nerve as well.

In fractures of the radius and ulna, the formation of a bridge of callus, matting of tendons in the reparative process, with also infiltration of muscle, are not commonly seen; further, obstruction to venous return, or possibly to arterial supply of a part, are also occasional complications; and then, *one and all,* occur *only* as the result of faulty apposition.

(*c*) *Pain.*—Aching pain, after healing by callus formation, extends far into the prolonged convalescence. As a parallel, "painful scars" in soft parts result from wounds which have granulated. It has seemed to me that the local aching is more pronounced with the wide separation of the fragments, and stands as an addition to the pain arising from overstretching of some ligaments and tendons which, in consequence of deviation of body weight, receive undue strain. As an example, I saw, a week or two ago, a gentleman who sustained a low fracture of tibia and fibula in Germany, where the fracture was "set" under anæsthesia, over three years ago. There is now no obvious deflection of body weight, but there is still some small amount of thickening at the site of fracture. Though an active man, and an athlete, he still at times feels an aching pain at the *site of the injury*, while, originally, he was three months under treatment before he could limp without a stick. When, on the other hand, accurate apposition has been maintained by operation and fixation, pain is conspicuously absent throughout the whole period of treatment.

The foregoing local considerations support the view that accurate apposition is necessary for perfect function in the upper limb as a prehensile structure, and, while many of these remarks will apply to the lower limb (though some of them with less force) there are a few further points, which chiefly concern the latter as a weight-bearing structure, to which I will briefly refer:—

(1) *Shortening.*—In fractures of the shaft and through and near the neck of the femur, there is practically always shortening; this in the shaft is due to overlapping or longitudinal displacement which, in spiral fractures, is always considerable; while only in the practically transverse fracture of very young children do we ever find next to no shortening, or shortening so slight that it can be overcome by extension. If end-to-end apposition is not obtained and maintained, a shortened limb will result. Such a limb may be useful, but can *never* be perfect in function; while, in spiral fractures and fractures of the neck, where shortening is always marked and sometimes extreme, the result is too often crippling for life. Eversion, too, so difficult to prevent in small degrees when apposition is not accurate, is only too likely to result, and forms a serious drawback to active occupation. The frequency, with which shortening and eversion result in these cases, makes examples superfluous. The same holds true with regard to fractures of the tibia and fibula, when there is longitudinal displacement, such as invariably occurs in spiral fractures, though not to the same degree as in the femur.

(2) *Deflection of Body Weight.*—The pressure of the body weight is normally distributed equally over the surface of a joint; and, if the sum of all these forces is taken, the result is a single force acting through the centre of the joint. After repair of a fracture with angular, longitudinal, or rotatory displacement, the line of this force is moved to one or other side of the joint. As a consequence, new bone is produced around the site of increased pressure, while absorption occurs in the neighbourhood from which pressure has been removed. In other words, the result is a pressure arthritis so ably demonstrated by Mr. Arbuthnot Lane.[1]

Further effects are particularly well illustrated in fractures of the tibia and fibula, where the line of pressure is deflected to the inner side of the astragalus. Not only does the ankle joint suffer, but all the ligaments, tendons, etc., supporting the inner side of the foot, are unduly stretched. Constant pain and a most distressing form of flat foot result, with remote alterations in most of the joint surfaces of the foot. (*See* Fig. 4.)

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[1] *Treatment of Fractures.*

Accurate apposition of the fragments is, therefore, the simplest and best way to prevent, with certainty, the occurrence of these secondary joint changes, by restoring the natural mechanism of the parts concerned.

I trust in the future to be able to add support to the foregoing remarks by the examination of large series of cases from different sources; a study which, I venture to hope, will also demonstrate, what personal experience has so often emphasised, namely, that any degree of certainty of obtaining end-to-end apposition is only possible by a direct attack on the injured parts by operation; and finally, that the following conclusions will receive confirmation:—

A *useful* limb may result from conservative measures, after a lapse of months or possibly years,[1] in some cases (depending on the severity of the injury) where the ends are not in apposition. This result may be brought about by careful attention, after accurate diagnosis, combined with a considerable proportion of good fortune. But that a functionally perfect limb is likely to be obtained under such conditions, even with the lapse of years (especially in the lower limb), experience compels me to emphatically deny.

I wish to express my indebtedness to Mr. Lane, Mr. Nitch, and Dr. Ironside Bruce for their kindness in allowing me to use the accompanying skiagrams, and my thanks are also due to those who have kindly allowed me to use their cases.

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[1] *Brit. Med. Journ.*, March 28, 1908: *Rep. Med. Soc.*, London.

COLOUR VISION AND ITS RELATION TO THE OTHER SENSES.

By G. ARBOUR STEPHENS, M.D., B.S., B.Sc.,

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About the year 1838, Professor Steinheil wrote as follows:—"Had we the means which could stand in the same relation to electricity that the eye stands to light, nothing would prevent our telegraphing through the earth without conducting wires."

To-day we can telegraph without wires, and messages are received by an instrument which stands in the same relation to electricity that the eye stands to light

This instrument is called a coherer, and the knowledge we possess of this coherer, in my opinion, helps us to more thoroughly understand the method by which the eye conveys to the brain the impressions of sight.

A coherer consists of a glass cylinder about seven inches long and half an inch in diameter. The cylinder is filled with metal filings, and fitted at the ends with copper pistons, which can be so regulated as to press upon the filings with any degree of force that may be required. This cylinder is placed in circuit with a weak battery, and a recording instrument such as a bell. The pistons are pushed towards one another so as almost to complete the circuit. The completion of the circuit is produced by the transmitted electric waves, which so re-arrange the metal filings as to reduce their resistance, thus allowing the weak current to pass and ring the bell. This re-arrangement of the metal filings is of very great interest.

Last year, I lectured before the Swansea Scientific Society, on what I ventured to call "Electrographs," and a summary of my lecture and experiments is recorded in the Transactions of that Society. I defined an electrograph as the result produced by passing electricity in one form or another over a sensitive photographic plate. The results are undoubtedly due to a re-arrangement of the silver particles by the current of electricity. The accompanying selected experiments will help to explain my meaning.

In Experiment II., two strips of lead ⅜″ wide were applied lengthwise to a sensitive film, and clamped. To the clamps at the ends, wire was attached, and the whole placed in circuit, with an 8-volt accumulator for 15 seconds. On developing the plate I got a shadowgraph of the two strips.

In Experiment XII., copper and lead strips were applied, and a current was passed from a small magnetic-electric battery, which was worked for three minutes, with a similar result as in Experiment II.

In Experiment XV., a five-shilling piece was applied to the sensitive film, and a momentary current was passed over the film from a strong secondary coil. The result was a good image of the coin.

In Experiment XVI., two sensitive plates were placed in circuit with the secondary battery for as short a time as one could possibly take in making and breaking the primary circuit. On one was placed a florin. When developed, one plate showed a good image of the coin, the other only the lines of the current.

Other experiments showed that a current, passed over a sensitive film at the time of exposure in a camera, considerably reduced the time of exposure. The question that naturally suggested itself, was whether, on exposing a sensitive film to light, a current was produced.

On placing a sensitive film in circuit with a galvanometer, no deflection of the latter was observed on exposing the film to light. The reason for this failure was easily explained, for, on testing the electrical resistance of the film, it was found to be extremely high. In order to overcome this difficulty, I obtained a few grammes of freshly prepared silver bromide (prepared in a dark room), and after having placed this in circuit with a galvanometer, I exposed it to light, when the needle of the galvanometer was at once deflected.

The difference between a "very rapid" plate and a "slow" plate principally consists in the different size of the silver particles: the readiness with which these particles re-arrange themselves under the influence of light-waves makes the resemblance to a coherer very marked.

Analogous experiments have been performed in connection with sound waves. The various figures, which lycopodium powder is made to assume, by vibrating glass plates with a violin bow, show that sound waves tend to produce a re-arrangement of particles. The re-arrangement of particles, produced in a coherer by the wireless waves, produces a change in its conductivity. What change is produced by the re-arrangement of particles in the production of sound pictures?

In the course of my experiments, I found that, if I caused a photographic plate to be vibrated by sound, it *became much more sensitive to light*, and a photograph could be taken by such means in a fairly dark room. I have shown above that sensitiveness to light is accompanied by a current as shown by the galvanometric change. *Anything that tends to increase such a sensitiveness must do it by producing either a current, or, what is practically the same, greater conductivity.*

Hence, one is driven to the conclusion that sound, light, and the Herzian waves all produce their effects by increasing conductivity, by a re-arrangement of minute particles.

Each, however, requires its own special "receiver," light its sensitive film of silver bromide, sound its lycopodium, and the Herzian waves their metallic coherer. The resemblance can be traced still further, for, each having produced its effect, that effect remains; the sound picture, the photograph, and the changed position of the particles in the coherer; and, in no case, do the particles resume their original position except by physical means, *e.g.*, the tapper of the coherer.

In this connection, it is well to point out that the different elements of the spectrum can cause a re-arrangement of the film particles, but, at a different rate and to a different extent :—violet rays quickly and greatly, the red slowly and slightly, but, in all cases, it is *the same re-arrangement, the same picture.*

But in the case of the retina of the eye, the light falls on living active particles, which move in response, and which, by virtue of their own vitality (in marked contrast to the photographic film), as quickly resume their resting position, when the stimulus is removed.

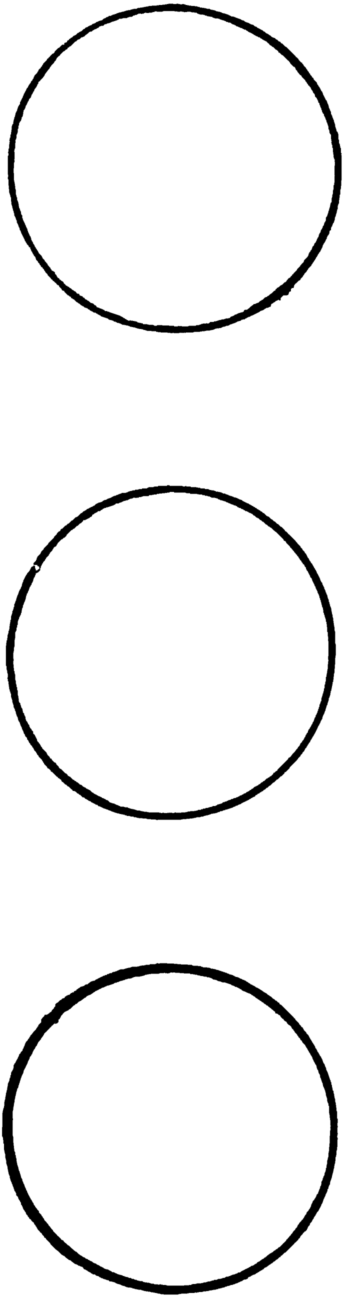
The dead particles of the film move in the same way, whether stimulated by violet, yellow, or red rays, *but the living particles of the retina move differently for each colour, for violet quickly and in one direction, for red slowly and in another direction.* Each particular movement, however, is accompanied by an increased conductivity, resulting in the completion of the cerebral circuit, and an intelligent appreciation of the original stimulus. Amongst such vital particles there must be much variety of activities, and it is in consequence of such variety that we find the different responses in different persons to colour sensations.

In colour-blind persons, who cannot recognise red, it is I think fair to assume that the movement of the retinal cells in one direction is slower, or almost entirely restricted, except when under the combined stimulus of white light, which combination acts by a process of contiguity. This does not mean that a colour-blind person is as equally appreciative of white light as a normal person, in fact, as a result of experiment, I found that, if a colour-blind person is made to stare at bright red for a minute, he is unable to properly distinguish between different shades of white paper.

The difficulty with the green colour in these persons is due to a want of balance, or uncertainty in the movement of the cells, which *sometimes* move in the direction they ought to, under the influence of red rays, *for colour-blind persons must have some idea of red,* otherwise they would not apply that attribute to various objects, sometimes correctly, at other times incorrectly. When one is tired, one's response is diminished to all colours, more particularly as regards time reaction. Were the response to the various colours of the spectrum part of the same movement, one would expect the response to red to disappear first of all, but the response, failing equally for all colours, we can feel confirmed in the opinion that there are different movements for the different colours. When we come to the subject of visual judgment, we find an interesting confirmation of this theory.

On the following pages, there are five different figures, each painted in red, green, and blue.

To no one person do the figures of a similar kind appear the same size, or one might express it better by saying "that



Note.—When this page is held vertically, *i.e.*, with the three figures of the same form but of different colours in a row, there is still a difficulty in realising that they are of the same size.

there is always an uncertainty about the relative sizes." The fact that the red figures appear to most persons to be the smallest, is only what is to be expected, for the red rays produce the smallest amount of movement. As movement plays an important part generally in our estimation of size, it is only fair to conclude that a corresponding retinal movement takes place as well with regard to individual colours as to their combined effect.

With regard to the sense of hearing, the experiments referred to above are of the greatest importance. Sound vibrations have the power of re-arranging minute particles, and such a re-arrangement as was proved in the case of my experiment with a sensitive photographic film, is always accompanied by an increased conductivity. Such a re-arrangement, or movement, I venture to suggest, takes place in the case of the living cells of the auditory organ when acted upon by sound vibrations. Accompanying such movements is an altered conductivity, which, in this case, as in the case of the retinal movement, results in the completion of the cerebral circuit, and an intelligent appreciation of the original stimulus.

The dead particles of a vibrating plate can convey but one or two changes, whereas the living cells of the organ of Corti can, in consequence of their vitality, participate in a large number of movements, sufficient in their permutations and combinations to account for their response to all the audible vibrations. When we consider the sense of taste and smell, we feel we are within the region of experimental physiology. I have but to refer to the experiments, which have been made in connection with the movement of cilia, to show that, when subjected to the influence of certain gases, *e.g.*, CO_2, and chloroform vapour, they are slowed, or perhaps stopped altogether, and are restored to their former activity by the application of a dilute alkaline solution.

May we not infer from these facts that sweet, bitter, acid, and saline solutions produce their effects upon the organs of taste by the various movements they set up in the cells of those organs, and that these movements are such as to produce an increased conductivity resulting in our being able to taste? (By completing the cerebral circuit.)

A similar effect is produced in the case of smell, whereby the various vapours produce different movements in the cells of the nasal epithelium, these movements also being accompanied by an increased conductivity.

In passing from the sense of sight to the sense of taste, we notice, in the former, the extremely sensitive and variable movements of the retinal cells, and, in the latter, the coarser and fewer movements of the taste-bud cells. Corresponding with the variety of movements of the retinal cells, we get the infinite variety of sight impressions, and with the restricted movements of the taste cells, the limited number of taste impressions. But in all cases, there is a movement, and a corresponding alteration in the conductivity of the cerebral circuit. In the case of tactile impressions, the cells of the organs employed in this sense are relatively deeply embedded, and carefully protected by the skin, so that the movements of these cells are still more restricted than any of the foregoing, with the result that, in some cases, as in the tip of the finger, they may move only in one direction, and give us the sense of touch, or, as on the cheek or forearm, they may move in two directions, and give us the sense of touch and temperature. In the case of all our senses, the effects are produced by responsive protoplasmic movements of the specially adapted sense-cells. In cells, which are liable to rapid movements, we find the nucleus extremely well developed, and this fact is well exemplified by the nuclear layers of the very responsive retinal cells, whereas, in the sense organs of more limited movements, the nuclei, though of considerable size, are not so numerous as to form a special layer.

Light, heat, and sound are all forms of motion, and, as such, are all mutually interchangeable; and the theory advanced here is one where the response in the different sense organs is held to be but an example of that mutual interchange. This interchange may account for certain sound vibrations causing movements of the retinal cells, and being the means whereby certain sounds are, in some persons, associated with certain colours.

Such a "perversion" of movement may possibly be found to be associated both with optical delusions, and also with mental delusions.

REVIEW ON VENEREAL DISEASES.

By J. ERNEST LANE, F.R.C.S.,
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THE TREATMENT OF SYPHILIS BY ATOXYL.

HALLOPEAU (*Bull. de la Soc. Franc. de Derm. et de Syph.*, June, 1908) describes the technique he is now pursuing in the injections of atoxyl. He daily injects ten centigrammes of atoxyl between the chancre and its satellite glands, with the object of destroying the treponema, or, as they are usually designated in this country, the spirochætes, which are in a state of activity. Of three patients so treated, two had a respite from secondary symptoms of from four to six months, with ultimately manifestations of the most mild and transitory nature; the third patient had been exempt from symptoms for a year.

His treatment was followed out by Renault, who reported five cases. In three instances, the secondary phenomena manifested themselves 15, 17, and 30 days respectively after the average interval for the second period of incubation. In four cases, there were no cutaneous manifestations, though there were ulcers on the buccal mucous membrane. Apparently Renault was not greatly impressed by the treatment, for he expresses the opinion that atoxyl is quite insufficient for the cure of syphilis. It improved the general health, and, in this manner, alleviated some of the secondary manifestations, but it did not justify the surgeon in abandoning the mercurial treatment. He found that the injections were painful, and they gave rise to nodosities, so that, ultimately, the patients refused to submit to them; they were useful as a tonic treatment, but could not be utilised as the fundamental treatment of syphilis.

Hallopeau was of opinion that the failure of the treatment, in the hands of Renault and others, was due to the insufficiency of the dosage. He recommended a larger dose, or, at any rate, more prolonged treatment, and, since he had utilised the crystallised atoxyl, no serious accident had been met with. He advocated two injections of 50 centigrammes of the drug at 48 hours interval, repeating the procedure every ten days. He thought that atoxyl was capable of aborting syphilis, and that, if injected into the inguinal glands during the evolution of the primary chancre, it certainly retarded the appearance of the secondary manifestations.

Gaucher (*Bull. de la Soc. Franc. de Derm. et de Syph.*, April, 1908) describes a case of syphilis treated for a year with atoxyl without any effect, which became grave for the want of mercurial treatment. The patient, a man of 43, was infected with syphilis in April 1907, and, on the advice of a surgeon, he consented to treatment by atoxyl at the Pasteur Institute. Two months after the chancre, he had roseola, which disappeared in three weeks under the treatment. But very shortly after this, he had an eruption of papular syphilides on the trunk and limbs, accompanied by severe headache. He was given injections of atoxyl every two or three days, until he had had fifty injections, many of which were followed by colic and vomiting. During the treatment the syphilides became ulcerating, and the headache persisted. Before the failure of the treatment, the surgeon, who attended him, advised mercurial injections, so he visited the St. Louis Hospital for that purpose. His symptoms, at that time, were rupial ulcers on the arms, mucous patches on the soft palate, the tonsils, and the cheeks, and severe nocturnal headaches. After fifteen daily injections of two centigrammes of hydrarg. benzoat., the headaches disappeared, the ulcers cicatrised over, the rupial crusts fell off, and the patient asked to go on with the treatment which had given him such relief.

The value of arsenic as an adjunct to mercury in the treatment of syphilis was recognised nearly half a century ago by Donovan, and the treatment by "Donovan's Solution" is frequently employed in this country. The late Professor Lassar instituted a treatment by injections of arsenic some years before his death, but did not advocate this method, as he found it insufficient and not to be relied upon. The writer has tried the treatment in only three cases, but, in justice to his patients, abandoned it, as he found it did not in the slightest degree check the evolution of syphilis; but, on placing these patients on mercurial treatment by means of calomel injections, the symptoms immediately abated, and were under perfect control after three injections.

THE TREATMENT OF SYPHILIS BY RECTAL INJECTIONS OF "GREY OIL."

Last year, Prof. Audry advocated the treatment of syphilis by rectal medication, a plan which has been continued by Boyreau (*Journ. des Mal. Cut. et Syph.*, March, 1908), who has treated 80 patients at the Toulouse Hospital in this manner. The treatment consisted simply of the introduction of suppositories of grey oil, in the dosage of three centigrammes for adults, and one centigramme for infants, daily. Under this treatment, the drug was rapidly absorbed into the system, as was proved by its early appearance in the urine, and also by clinical observation, which showed that the syphilitic manifestations, especially those of the buccal mucous membrane, rapidly moderated, and often promptly disappeared. The improvement in every case was remarkable, and commenced at about the 4th to the 6th day after the treatment had been initiated. It might be objected that rectal medication did not ensure a sufficiently rapid and complete absorption to enable it to cope with the graver manifestations of the disease, nor was it for a moment contended that it was appropriate in cases, in which a patient required to be rapidly got under the influence of mercury. But, it was found that in patients, in whom the action of the suppositories appeared to hang fire, the substitution of inunctions, or intra-muscular injections, met with no greater success. This method had the advantage of being practical and also painless, and the suppositories had very little irritating effect upon the rectal mucous membrane. It was true that the treatment could not be continued over any very prolonged period, but one case was cited, in which a child had 200 of these suppositories, without showing the slightest local or general intolerance. Proctitis ensued only on rare occasions, and, in a very few cases, slight pain on defæcation and tenesmus were observed, and these symptoms subsided after a short interruption of the treatment.

In two instances, fissure of the anus occurred, but the situation of the lesion and the absence of any inflammatory symptoms, led to some doubt as to whether these could be ascribed to the treatment. One great advantage of the treatment was that the digestion was in no way interfered with, a point of some importance in the case of anæmic subjects; it was carried out easily and expeditiously, and, as the suppositories were introduced at bedtime, the night was utilised for their absorption; it did not give rise to any pain, and so contrasted favourably with the treatment by intra-muscular injections, nor was it dirty and repulsive to the sensitive patient, as was the inunction method. It was one of the best means of avoiding the inconveniences, which are inevitable in the other plans of mercurial treatment, and its absorption and elimination did not appear to be ever attended by any of the accidents which had been ascribed to other methods of treatment. Mercurialism very rarely supervened, and stomatitis, which so often followed inunctions and injections, had not been observed, while, as regards the diarrhœa of elimination, this was never severe, and had always yielded to a sulphate of soda purge. The treatment was perfectly satisfactory in the ordinary case of benign syphilis, especially when some period of time had intervened since the inception of the disease, so that it might with advantage be substituted for the cutaneous, buccal, or intramuscular methods where stomatitis, mercurialism, painful nodes, or gastro-intestinal troubles might be anticipated. From its simplicity, it was applicable in the case of young children, the subjects of syphilis, hereditary or acquired, and in these the treatment was well tolerated. It was not to be commended in old subjects, in the intemperate, or where the disease might be expected to take on a severe or malignant phase, nor should it be prescribed to patients suffering from any rectal disorder, such as ulceration, fissure, or hæmorrhoids.

THE FALLIBILITY OF CALOMEL OINTMENT AS A PROPHYLACTIC FOR SYPHILIS.

(*Journ. de Méd. et de Chir.*, March, 1908.) Notwithstanding the good results, which have been obtained by Metchnikoff, in the prophylaxis of syphilis by the application of strong mercurial ointments, the method is not one upon which absolute reliance can be placed. Butte has just published two striking instances in which, notwithstanding the employment of calomel ointment made up with lanoline at a strength of 1 to 3, and, notwithstanding its vigorous application immediately after coitus and renewal an hour subsequently, the syphilitic chancre appeared after the customary interval. Cases of this sort are not uncommon, and without wishing to discredit a method which may be of some service, it is well that the public should not place absolute reliance on this plan. Measures had recently been adopted in the French Army, which would lead the soldier to believe in the absolute safety of the method, and which would give him a fallacious idea, abolishing in his mind the fear of disease which was one of the best safeguards against its spread, and he would consequently not hesitate to run risks which he would otherwise not have incurred. The application of calomel ointment might be advised in the same way as might any of the other possible safeguards, but it should not be designated as the measure of prophylaxis to the exclusion of all others.

Carle (*Lyon Médical.*, *No.* 6) also criticises the theory that the application of calomel ointment is an absolute guarantee against syphilis, and considers that the instructions issued to the French troops would only inspire them with a false confidence. The instructions are valuable, and their wording was excellent, and the military surgeons were to be applauded for their efforts to safeguard the health of their men. But its applicability to the civilian is a different matter, for two reasons: the majority of young men, simple-minded, and ignorant on the subject, will regard these steps as a means of enabling them to gratify their sexual instincts free from any risk of danger, and the judicious instructions as to prophylaxis, circulated with the best of intentions, will be considered by the advocates of continence, as a distinct invitation and encouragement to immorality. The authors of the circular to the troops have relied solely on the communications of Metchnikoff, though, a slight further study of the literature of the subject, would have taught them that, in addition to precautions to be taken after coitus, there are others equally valuable which might be taken before, and in the opinion of

Carle, the application of Marseilles soap had probably saved more people from syphilis than calomel had ever done, or would do in the future.

THE MARRIAGE OF SYPHILITIC SUBJECTS.

Civatte (*Ann. de Derm. et de Syph.*, December, 1907), having instituted an inquiry amongst the syphilographers of all nations as to the time when syphilitic subjects should be permitted to marry, cites the answers he has received from many distinguished workers in this field. Without describing, in any detail, the replies given to his question, it may be mentioned that amongst those applied to were Finger, Jadassohn, Unna, Hutchinson, Nevins Hyde, Gaucher, and Thibierge. Of those consulted, all were of opinion that marriage should be permitted, under certain conditions, and with certain restrictions, with the exception of Mibelli, of Parma, who considered that, in the presence of facts showing that syphilis remained contagious almost indefinitely, it was unjustifiable for a doctor to allow any syphilitic to marry. All were in accord that the syphilitic, who desired to marry, should not only have taken mercury, but should have taken it in sufficient quantity, and for a sufficient time. Signs of mercurialism should have been observed, and no symptom of disease should have been present for a long time. As to the length of time that should have elapsed since the disappearance of symptoms, there were differences of opinion. Some thought, with Fournier, that four years of intermittent treatment were requisite, and that, during the last two years, there should have been no manifestations of disease. The lowest time given was two years only between the inception of the disease and marriage—an opinion which was universally prevalent in America and England.[1] The longest time given was ten years, by Hernheimer, of Frankfurt. Great importance was attributed, in Germany, to the total disappearance of the glandular enlargements, as a proof of the efficiency of the mercurial treatment, and also of the local treatment of the glandular lesions. Nearly all compel the candidate for matrimony to undergo a last course of treatment, which might be called the "safety cure." To conclude, time and mercury, which are nevertheless not always sufficient, are the two great elements which allow us to judge the difficult and delicate question as to the marriage of a syphilitic.

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[1] The writer would be inclined to criticise that statement, and to express the belief that, in our country, a large number of surgeons are of opinion that two years' treatment is insufficient, and that at least double that time should elapse before permitting the patient to marry.

PROSTATIC INFECTION IN GONORRHŒA.

Wolbart (*New York Medical Journal,* March 7, 1908) lays stress upon the necessity for eliminating the gonococcus from every portion of the genito-urinary tract, and points out that a number of patients, discharged as cured, are not really so, but may be still harbouring germs in the prostate and its annexa. He points out that a large number of cases of gonorrhœa become chronic or relapsing, the discharge reappearing on slight provocation, such relapses being due to the gonococcus having remained dormant in the prostate for months, or even years, after infection. He arrives at the following conclusions:—

1. The so-called incurable or recurrent cases of gonorrhœa are those in which the gonococci remain latent in the prostate and annexa.
2. Every case of chronic gonorrhœa should be examined for gonococci in the prostate, etc.
3. The morning urine passed by the patient may or may not contain gonococci; but the urine, after massage of the prostate, will be found to contain pus, epithelium, and large numbers of gonococci.
4. Before a patient can be declared cured, and marriage sanctioned, he should be put on the customary tests, and in addition the massaged prostatic secretion should be examined at weekly intervals for six weeks, in order to ensure the complete absence of the germ.

A REVIEW OF RECENT NEUROLOGICAL LITERATURE.

BY WILFRED HARRIS, M.D., F.R.C.P.,

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THE REFLEXES.

THE extensor type of plantar reflex, described by Babinski more than ten years ago, has been of inestimable service as an additional clinical sign in the diagnosis of organic lesions of the pyramidal system. Various modifications of this reflex, and additional ways of obtaining it, have since been described by numerous observers, while the meaning of the abnormal reflex has become more thoroughly understood. In 1899, Schäffer described an "antagonistic" plantar reflex in cases of organic lesion of the pyramidal tracts, in cases in which the extensor plantar reflex was obtained by the ordinary method of tickling the sole of the foot. His method consisted of gripping the calf muscles deeply, and firmly pressing into the muscles in the middle of the back of the calf. This produces an extension movement of the great toe, and perhaps of the smaller toes also, though, in normal persons, if any reflex of the toes is produced, it is of the flexor type.

Oppenheim of Berlin, in similar cases, demonstrated another mode of obtaining plantar extension, instead of the normal flexion of the toes, by pressing the handle of the percussion hammer firmly on the skin and muscle along the inner side of the tibia with a drawing stroke. When present, this sign practically always accompanies other signs of spasticity, as increased knee-jerks, and the ordinary Babinski reflex. In December 1904, Gordon, of Philadelphia, apparently independently, described what he claimed to be a new reflex, and which he named the "paradoxic flexor reflex." It is, however, clearly the same form of abnormal plantar reflex that Schäffer had previously described in 1899. Gordon has examined a large number of cases with respect to this reflex, and asserts that normal and functional cases never show it, while he has obtained it in many cases of organic spinal, or cerebral disease, in which the ordinary method of obtaining the Babinski reflex failed to obtain extension of the great toe. Indeed Babinski himself showed that, in spastic cases, not only the skin of the sole, but also that of the leg, or even the thigh, may give an extensor response on stimulation. Thus the reflexogenous zone of the abnormal plantar reflex is more extensive than is usually supposed. The form of the extensor plantar reflex varies in different cases; in some, the great toe alone is extended, while the other toes remain either stationary or are flexed; in others all the toes are extended together, becoming spread out fan-wise, the "fan reflex" of Babinski. The most spastic cases usually give a slow sluggish extension movement of the great toe, while the less spastic cases, who are still well able to walk about, usually give a much brisker movement of extension of the toes. This difference is no doubt dependent on the altered tonus of the muscles in the more spastic cases, as the faradic reaction of the leg muscles, in these cases, is much more sluggish than those of normal muscles.

Noica and Sakelaru (*La Semaine Méd.*, December 19, 1906) describe two plantar reflexes, internal and external, corresponding with the areas supplied by the internal and external plantar nerves. The external plantar reflex is almost always the more easily obtained, and they frequently obtained an extensor plantar reflex by stroking the outer side of the sole in slightly spastic cases, when a flexor reflex resulted from the ordinary method of stroking the inside of the sole.

A *crossed flexor plantar* reflex in spastic cases has been described by Byrom Bramwell, and by Knapp. In rare cases of hemiplegia, or spastic paraplegia, the same stimulus, which provokes an extensor plantar reflex in one foot, produces a flexion of the great toe on the other side. This condition may be bilateral, so that, in a case of spastic paraplegia, stroking the sole of either foot may produce an extensor plantar on the same side, and a crossed flexor plantar on the other.

It is generally accepted that the normal flexor plantar reflex is a cortico-spinal reflex, whereas the abnormal extensor plantar is a purely spinal reflex, which appears in earliest infancy before the cortico-spinal paths are fully developed, and, again, in cases of lesion of the cortico-spinal fibres, especially of the pyramidal fibres from the motor cortex.

The question whether it is possible for an extensor plantar reflex to exist in hysteria, without any organic lesion, has been much debated, and it is almost universally believed to be an absolute sign of organic interference with the function ot the cortico-spinal fibres. The writer, however, published five years ago (*Rev. of Neurol. and Psych.*, May 1903) two cases of hysterical paralysis, in which there was bilateral extensor plantar reflex present for several days, afterwards changing to flexor type after dissipation of the hysterical symptoms. Two years afterwards, there was no sign of organic disease present in either case. Van Gehuchten (*Le Névraxe*, January 25, 1907) considers it possible that the Babinski reflex may occur in exceptional cases of hysteria, from psychic interruption of the cortico-spinal fibres. It is now well known that no permanent lesion of the pyramidal system is necessary for the production of the Babinski reflex, since its temporary occurrence is common from exhaustion of the motor centres after Jacksonian convulsions; it has, moreover, been frequently observed as a temporary phenomenon after ordinary epileptic fits, and under anæsthesia from scopolamine and morphia. Hysterical paralysis and anæsthesia are usually admitted to be due to an auto-inhibition of the lower motor and sensory centres, and it does not seem difficult to suppose that, in certain exceptional cases of hysteria, the inhibitory process may so affect the cortical motor centres as to interrupt the completion of the cortico-spinal plantar reflex, so that the primitive spinal type of extensor plantar reflex is temporarily substituted.

ABNORMAL SIGNS IN HYSTERIA.

Quite comparable with this abnormality of the plantar reflex is the rare but undoubted fact that loss of the knee-jerk may be a temporary phenomenon in hysteria. This occurred in a case I published in *Brain*, 1897, p. 312, as a case of hysterical hemianopia, and other cases have been published by Dejerine, Marie, and others. Indeed, a large number of symptoms and physical signs, that have been held to be conclusive evidences of organic disease, may occur exceptionally in hysteria. Incontinence of the sphincters is a symptom usually held to absolutely exclude hysteria, yet retention is well known to occur in this disease, and I have even known incontinence to occur more than once, doubtless of mental origin. One such case of incontinence of both sphincters occurred on several occasions in a man suffering from hysterical hemiplegia and anæsthesia after a railway accident. During the negotiations for compensation, he got steadily worse, though he completely recovered within a short time of their conclusion, and has been in perfect health since for more than seven years.

The differential diagnosis between hysterical and epileptic convulsions may similarly give rise, in certain cases, to the greatest difficulty, and Putman and Waterman (*Boston Med. and Surg. Journ.*, April 1905) discuss the question at length. In the condition known as psychasthenia, attacks of apparent unconsciousness occur, which may be extremely difficult at times to distinguish from epilepsy. Spiller, Oppenheim, and Janet have described them as occurring in persons who show none of the well-known hysterical stigmata. They differ from epilepsy in that no attacks occur in childhood, whereas psychopathic traits are frequent as various tics, anxiety, and different phobias. The attacks are few in number, there may be profound unconsciousness, with little or no convulsion. They develop, under the stress of overwork, various excesses, sleeplessness, and anxiety.

THE ABDOMINAL REFLEX.

This superficial reflex, obtained by lightly but quickly stroking a finger-nail or pin across the hypochondrium on each side, may be of great assistance in the differential diagnosis of hysteria and organic brain disease.

Diminution, or loss of the reflex on one side, is very strong evidence of the presence of an organic lesion, and it may be the determining point in the diagnosis when other signs of hemiplegia are slight and indefinite.

Babinski lays even greater stress on the unilateral loss of the cremasteric reflex in similar conditions.

The abdominal reflex is lost on both sides in acute abdominal disease, such as enteric fever, appendicitis, or peritonitis, and this sign may, therefore, be of use in distinguishing enteric from influenza, etc.

DEVIATION OF THE TONGUE IN HEMIPLEGIA.

Beevor (*Brain*, 1906) discusses the cause of the deviation of the tongue towards the paralysed side, when protruded in hemiplegia. His experiments with Horsley showed that the tongue area on the cortex may be divided into three parts, an upper, which gives on stimulation protrusion of the tongue to the opposite side, and a lower, whose front portion gives protrusion straight, and whose posterior portion gives retraction. The tongue is an organ, composed of two symmetrical halves fused together, and if it is completely split in the mid-line, it is found that stimulation of the lower anterior tongue centre on one side of the brain causes protrusion straight of both halves of the tongue, a truly bilaterally represented movement. Stimulation of the upper portion causes the half of the tongue on the same side to be protruded towards the opposite side, while the opposite half of the tongue is retracted. In every movement of the tongue, produced by cortical excitation, both halves always take part. In hemiplegia, it is more difficult to put the tongue into the cheek on the paralysed side than into the other, and Beevor suggests that both hemispheres always take part in producing movements of the tongue, and, when there is a lesion of one side of the brain, causing hemiplegia, the action of the other hemisphere is not balanced, and therefore the tongue is protruded towards the paralysed side, when an effort is made to put it out straight.

AMYOTONIA CONGENITA.

This disease was first described by Oppenheim as Myatonia congenita in 1900. The disease is mostly congenital, the infants being limp and powerless, especially in the legs, from birth. In a few cases, it has been seen to develop, after some acute illness within the first twelve months, in children previously healthy. In all the cases, the lower extremities have been thin, powerless, and extraordinarily hypotonic, so that the ankles can be dorsiflexed, until the dorsum of the feet touches the shin, and the other joints become excessively mobile in similar degree. The children cannot stand or walk, but squat frog-like, and huddled up. The muscles are extremely flabby and thin, and scarcely react to faradism. The knee-jerks are nearly always absent, but have been seen to return. In a few cases the arms escape, as may the trunk muscles, but improvement is very slight and slow. The pathology of the disease is uncertain, though two autopsies have been recorded by Baudouin and by Spiller. The central nervous system is unaffected, and there is no neuritis, but, in one of the cases, there was intense muscular sclerosis, and atrophy, or arrest of development, of the anterior motor roots. By some, the disease has been thought to be a form of infantile myopathy, but it differs from other forms in that it may improve under treatment. A good résumé of 25 cases is given by Collier and Wilson in *Brain*, part 1, 1908. Besides myopathy, the disease is to be distinguished from rickets and infantile paralysis.

THE NEURON THEORY.

Barker (*Journ. Amer. Assoc.*, March 1906) gives a good abstract of modern work on the neuron theory and concept, though, as is unavoidable, his writing is somewhat tinged with partisanship against the would-be destroyers of this doctrine. The term was first introduced by Waldeyer, in 1891, in a masterly series of articles in the *Deut. Med. Woch.*, embodying the modern trend of thought, originated by His' embryological studies of the nervous system commenced in 1886. The new view denied the older teaching of Gerlach, which had long held the field, that there was a continuous nerve network throughout the gray matter of the central nervous system, and insisted on the individuality of each unit, or "neuron," consisting of the nerve-cell with its dendrites, its axis cylinder process, and all the collateral and terminal ramifications of the latter. On this basis of ascertained fact was built up the neuron doctrine that: (*a*) There is no nerve fibre independent of a nerve cell, and every fibre is a process of a nerve cell. (*b*) The neurons are independent of each other, related histologically and physiologically by contact only. (*c*) The neurons are so arranged that a nerve impulse in a given neuron always follows in one direction, from dendrite to cell-body, from cell-body to axis cylinder process, and thence to dendrites of another neuron. (*d*) All parts of the neuron are dependent on the nutritive influence of the nucleus of the cell body, and the whole neuron is derived from a single body cell. (*e*) When a nerve fibre degenerates as a result of severance of connection with the cell body, regeneration of the axis cylinder takes place by outgrowth from the central end. There have been numerous bitter opponents of this theory, prominent among them being Apathy, Held, Bethe, Nissl, and Golgi, while Cajal, Marinesco, also Mott and Halliburton, Langley and Anderson, in this country, have brought forward fresh proofs in support of it. The chief practical point, on which the theory bears, is the question of the regeneration of nerves. According to the exponents of the neuron doctrine, all repair of nerve fibres takes place by downgrowth of the axis cylinders from the central stump, while its opponents maintain the existence of autogenetic regeneration, that is to say, that nerve-fibres in the peripheral end of a cut nerve regenerate, even though union with the central end is prevented. Mott and Halliburton, and Langley and Anderson have shown that the apparent restoration of function, in these cases, is due to union of the peripheral end of the cut nerve with other branches of cut nerves in the neighbouring skin and tissues, thus re-establishing connection with the central nervous system. Cajal, in 1903, and Bielschowsky, and also Donaggio, in 1905, by a new staining method, which stains the neurofibril networks but leaves the glia totally unstained, have demonstrated Bethe's and Apathy's preparations to be misleading, and that the Golgi pericellular nets are glial and not nervous in origin. Thus Nissl's "nervous gray" has been shown not to be entirely nervous in structure, and Cajal is more convinced than ever that the neuron theory is valid. More recently, in 1906, Harrison in the *Jour. of Experim. Zoolog.* has demonstrated, by delicate embryological work, that the peripheral nerves are not formed from strands of cells in the tissues, but are actually processes of the central nervous axis. Thus he showed that cutting away the neural crest in tadpole larvæ prevented the formation of sensory nerves, while the motor fibres grew unaltered, and cutting away the ventral portion of the neural tubes permitted the growth of normal posterior roots, but no motor fibres then appeared.

The exponents of the neuron doctrine admit the great importance of the proliferating neurilemma cells in the repair of a divided nerve, but maintain that it is as a supporting structure only, and that these cells are never transformed into new axis cylinders, as the anti-neuronists declare. Their great importance in the repair of a divided nerve is well shown by the absence of repair of divided nerve fibres in the spinal cord and brain, where there is no neurilemma, although there may be the most perfect co-adaptation of the cut ends.

THE TREATMENT OF TRIGEMINAL NEURALGIA.

The treatment of epileptiform neuralgia, or tic doloureux, by drugs has long proved a failure, the patients ultimately becoming morphinists, or cocaine takers, or even suicides in order to escape the intolerable pain. Various methods of treatment by electricity have also been advocated, with no better result in the majority ot cases, though of late the method of cataphoresis has been invoked, and cocaine from the positive pole and salicylate of soda from the negative pole, using strong currents, have been made use of by the new treatment of ionisation. Division of the peripheral branches of the various three divisions of the fifth nerve has been practised for years, and usually brings relief for a time, the interval of freedom from pain being roughly proportionate to the severity of the operation, and the proximity of the nerve division or excision to the Gasserian ganglion. It has generally been agreed that, of operative procedures, it is only the excision of the ganglion itself that meets with any permanent success, but this is a most formidable operation, necessitating opening of the skull, and considerable compression and manipulation of the brain, before the site of the ganglion can be reached. Even then the operation sometimes fails, only a part of the ganglion being removed, with consequent incomplete anæsthesia, and only partial relief from pain, while the death roll is heavy, and even, after apparent cure, recurrence on the opposite side may take place.

Injection of the peripheral branches ot the affected nerve with osmic acid, chloroform, cocaine, etc. has been adopted, though, until recently, the injections were mostly subcutaneous only in the region of the painful spots. In 1902, Schlösser first began deep injection of the three main branches with an 80 per cent. solution of alcohol, and he stated, at Wiesbaden, during the Medical Congress in April, 1907, that he had treated, with repeated injections, 123 cases of trigeminal neuralgia, the average period of relief from pain in each case being 10½ months. Repeated injections, however, delay the recurrence of the pain more and more, promising ultimate immunity. His injection treatment has been followed by Ostwalt, Levy and Baudouin, and Brissaud and Sicard in Paris, and by Kiliani and Patrick, among others, in America, each recording an extraordinary degree of success in relieving the pain. The technique has varied slightly with the different experimenters. The object of the injection is to place, in the sheath of the nerve and around it, a strong solution of alcohol, the immediate result being a strong burning sensation followed for a week by anæsthesia of the distribution of the nerve. Subsequent restoration of sensation is usually free from reappearance of the pain, at any rate for some time, when the injection may be repeated, each injection delaying the recurrence longer.

Schlösser is not content with making deep injections into the nerve trunks, but also injects the peripheral branches, thus the supraorbital branch at the eyebrow, the infraorbital nerve at its point of exit, and the inferior dental nerve at the mental foramen. The third division of the fifth nerve is injected at its point of exit from the foramen ovale, the needle being sometimes passed through the foramen in order to inject the Gasserian ganglion itself. In order to reach this spot a needle at least 3 inches long should be used, as the foramen lies just under 2 inches from the surface. The point of the needle is introduced about ¼ inch below the zygoma, and about half an inch in front of the external auditory canal; the point is directed slightly upwards and backwards, until it strikes the base of the skull, when the handle is slightly raised, and the point pushed on into the foramen ovale, which should be reached at a depth of about 2 inches, the needle being graduated for guidance. The injections are made without any anæsthetic being given, about 15 to 20 minims of the alcohol being injected. The line, recommended for the injection of the superior maxillary branch at its exit from the foramen rotundum, is much more difficult, the point of the needle being likely to hit against various bony prominences, as the coronoid process of the inferior maxilla, the pterygoid processes, etc. The nerve also lies deeper, at a depth ot 2½ inches from the point of insertion behind the malar bone. The route for the first division is intra-orbital and less satisfactory, but this is of less importance, since this is the least frequently affected division of the nerve. Ostwalt makes his injections from within the mouth, claiming to reach all three divisions of the nerve with one puncture, but this method cannot be so satisfactory owing to the impossibility of making certain of asepsis. The great attractions of this method of treating trigeminal neuralgia lie not only in the very high percentage of cases relieved, but because the injections can be performed without anæsthesia, because there is no shock, and because the injections can be repeated as often as required, should there be any reappearance of the neuralgia.

AN ACCOUNT OF THE THEORY AND EMPLOYMENT OF BIER'S METHOD OF TREATMENT BY PASSIVE CONGESTION IN CASES OF RHEUMATOID ARTHRITIS, TUBERCLE, SEPSIS, AND VARIOUS OTHER CONDITIONS.

By A. W. WAKEFIELD, M.A., M.B., B.C.

It is only about seventeen years since Professor August Bier, of Bonn University, first advocated treatment by congestion. That his theories have a practical value is evidenced by the fact that medical men from most civilised countries, having tried the treatment in their own practices with some measure of success, are now attending the Professor's clinic in order to acquire more detailed knowledge of his methods. With this object in view, I recently visited Bonn, after having been for some years interested in this form of treatment. It was largely owing to the kindness of Professor Bier and his assistants in placing at my disposal all facilities for watching the cases treated by congestion that, whilst at Bonn, I was able to gather valuable information as to the application of the theories so ably advocated in the Professor's book, *Hyperæmie als Heilmittel.* To the novel ideas and suggestions in this valuable work, as well as to the kindness of Professor Bier in demonstrating the application of these principles, I would here express my indebtedness. Many of the following arguments and experiments are quoted from the book mentioned above, to the reading of which, in fact, I owe the original interest which led me to investigate for myself this line of treatment.

Bier recommends, as valuable remedies for many conditions, the use both of active hyperæmia, produced by hot air, massage, etc., and also of passive congestion. In this country, active hyperæmia has been employed for many years, passive congestion has, however, only recently come to the fore. For this reason, and also because my own investigations have been chiefly directed towards the action of passive congestion, I propose to discuss the latter form of hyperæmia only, emphasising such details as may be necessary for the guidance of those unacquainted with the treatment. The word "congestion" will mean passive or venous congestion only, unless otherwise stated.

I shall deal with the various points in the following order:—

(1) The history of treatment by congestion.

(2) Actions of, and theories concerning, congestion.

(3) Methods of producing congestion, and general rules to be observed. Choice of method to produce congestion.

(4) Objections.

(5) Special points concerning the treatment of:—
  (*a*) Rheumatoid arthritis.
  (*b*) Tubercle and mixed infections.
  (*c*) Sepsis.
  (*d*) Mastitis.
  (*e*) Gout.
  (*f*) Gonorrhœal arthritis.
  (*g*) Other conditions for which congestion has been recommended.

(1)—THE HISTORY OF TREATMENT BY CONGESTION.

The first record of the employment of artificial congestion known to Bier occurs in Ambroise Paré's[1] account of how he treated in this way non-union of fractures due to deficient callus formation. He also employed congestion to reduce superabundant callus.[2] The next record of this method, quoted by Bier, is that which was published by Nicoladoni, in 1875,[3] describing the treatment of false joints. The congestion was produced by a rubber bandage above the lesion, and was restricted to the affected part by bandaging the limb upwards from its extremity almost as far as the lesion. He refers to this as "Dumreicher's method." The latter, however, according to Bier, produced the congestion by applying wedge-shaped pads, with their broad ends directed towards the affected part, above and below the lesion.[1] Bruns, in his lectures on fractures, in 1886,[2] mentioned five cases treated by congestion. In the same year, Thomas[3] recorded 14 cases of delayed callus formation after fracture, treated by congestion with excellent results. Helferich, in 1887,[4] again recommended congestion as a stimulus to bone formation.

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[1] *Œuvres complètes d'Ambroise Paré*, Ausgabe von Malaigne, 11 Bd. LXIII. Ch. XXX.

[2] *Ambroise Paré*, Buch 13, Ch. 30.

[3] *Wiener med. Wochenschr.*, 1875, Nos. 5, 6, and 7. "V. Dumreicher's Methode zur Behandlung drohender Pseudarthrösen," Nicoladoni.

Bier was first led to adopt congestive treatment for tubercle, about the year 1890, by consideration of the frequency of phthisis in persons, whose lungs are anæmic owing to stenosis of the pulmonary cardiac orifice, or other cause; and the rarity of phthisis in those who suffer from mitral stenosis, or incompetence, or other condition tending to congestion of the lungs.

(2)—ACTIONS OF, AND THEORIES CONCERNING, CONGESTION.

There is an old saying that "Nature makes the best doctor," and recent scientific observations tend, on the whole, to confirm this observation. True it may be that science can call to her aid appliances and principles which are not strictly found in Nature's text-book, but, on reflection, one notes that these are for the most part but elaborations of Nature's methods, usually designed to hasten the end which Nature achieves, more slowly no doubt, but often more deftly and efficiently. Thus, by noting Nature's almost universal practice of utilising hyperæmia as a therapeutic agent, we cannot help being led to the conclusion that hyperæmia and inflammation, up to a certain grade, are beneficial, and are Nature's reaction to, and method of counteracting, many injurious influences. It is a curious and interesting fact that physiological, functional, hyperæmia is almost universally active hyperæmia, while that called forth by pathological processes is frequently passive. Now Bier argues that, in such chronic conditions as rheumatoid arthritis and tubercle, the irritant is so mild that it does not stimulate Nature to produce a degree of hyperæmia sufficient to subdue the disease. In such cases artificial increase of the hyperæmia is often beneficial.

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[1] Bier: *Hyperæmie als Heilmittel*, 1906, p. 58.

[2] Bruns: "Die Lehre von den Knochenbrüchen," *Deutsche Chirurgie*, Lieferung 27, 1886, p. 597.

[3] Hugh Owen Thomas: *Contributions to Surgery and Medicine.* Part 6: "The Principles of the Treatment of Fractures and Dislocations." London, 1886.

[4] Helferich: "Über künstliche Vermehrung der Knochenbildung," *Verhandl. d. deutschen Ges. für Chirurgie*, 1887, II. Bd., p. 249, and *Archiv für klinische Chirurgie*, 1887, 36 Bd., p. 873.

Relief of Pain is perhaps the most striking action of congestion. It is often very marked in cases of rheumatoid arthritis, gonorrhœal and tuberculous joints, sepsis, mastitis, and gout. I have frequently seen a patient, suffering from severe pain, so completely relieved by congestion that he was able to fall into a sound sleep shortly, sometimes within two or three minutes, after the bandage had been applied. The value of this is apparent on consideration of the vital need of refreshing sleep to many of these patients. This relief of pain is doubtless partially due to the beneficial result of congestion on the disease itself. But this cannot be the sole cause, for the relief is so quickly effected that it would seem impossible for the disease to have been influenced to any degree in so short a time. Moreover, for the first few days, the pain generally recurs during the intervals between the periods of treatment. Ritter[1] claims to have proved experimentally that hyperæmia reduces the sensibility of the tissues. Bier[2] holds that heat relieves the pain, not by the old-fashioned theory of "de-congestion," but by causing hyperæmia, and he states that active and passive hyperæmia are of equal value for all chronic stiff joints that are painful.

It is frequently argued that if a painful area, *e.g.*, an inflamed finger, is allowed to hang down, and thus to become slightly congested, the pain is often increased. This is certainly true, but it does not affect the fact that a proper degree of artificial congestion will relieve the same pain. I am not able to explain this apparent anomaly.

Abatement of Fever.—In cases of cellulitis, etc., with symptoms of toxæmia, a most extraordinary change for the better often comes over the patient soon after congestion has been produced. This is probably due to the pressure of the bandage preventing, to a large extent, the toxins from gaining access to the general circulation. Be this as it may, the fact remains that, in most instances, soon after the bandage has been applied the temperature begins to drop, the pulse rate becomes lowered, the restlessness diminishes, the sweating decreases, the patient becomes less flushed, and the appetite improves.

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[1] Ritter: "Die natürlichen schmerzlindernden Mittel des Organismus," *Verhandlungen der deutschen Gesellschaft für Chirurgie*, 31. Kongress, 1902, and *Archiv für klinische Chirurgie*, 68. Band, p. 429, and *Die praktische Bedeutung der natürlichen Schmerzlinderung*. *Die Heilkunde*, VII. Jahrgang, 5 Heft, 1903.

[2] Bier: *Hyperæmie als Heilmittel*, 1906, p. 136.

It has been argued that, if this is due to the damming back of toxins from the general circulation, the removal of the bandage must be accompanied with danger owing to the concentrated toxins being now free to enter the blood-stream. It is true that the symptoms of toxæmia may quickly return after the removal of the bandage, but I have heard of no case in which this rapid return of symptoms has aggravated the danger of the condition, in fact, the fever is often not so high as it was before the congestion.

Prevention of Stiffness.—In addition to merely allaying the pain, congestion tends to prevent a painful joint from becoming stiff. For stiffness is often due, not to gross anatomical causes, but to muscular spasm, caused by, and disappearing with, the pain.

It is true that stiffness, cured merely in this manner, will soon recur, but as the diseased condition improves, the cause for the stiffness will also disappear, and the formation of adhesions will have been prevented owing to the movements of the joint permitted by the analgesic action of congestion. That such movements, properly undertaken, do not injuriously affect the diseased tissues, except possibly in some cases of tubercle, will be shown later.

Bactericidal Action.—It is no uncommon thing to see microbic disorders heal very rapidly, sometimes undergoing quite a sudden change, on receiving treatment by congestion. Experimental proof of this bactericidal action of congestion is given by Notzel.[1] He injected fatal doses of anthrax and streptococci into 67 rabbits in areas where he had already produced great congestion. Of these, 51 lived, and the 16 that died all had the injurious "White Stasis" (to be discussed later). The control experiments on other rabbits all caused death, and the 51, when injected with the same cultures some weeks later, without previous congestion, all died.

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[1] Nötzel: "Über die baktericide Wirkung der Stauungs-Hyperæmie nach Bier," *Archiv für klin. Chirurgie*, 60. Bd., 1. Heft, and *Verhandlungen der deutschen Gesellschaft für Chirurgie*, 28. Kongress, 1899, II. Bd., p. 661.

Of the various views, taken by different authorities as to the method of this action, I will refer to one only, that of Hamburger,[1] who states that the œdematous lymph, produced during periods of congestion, is more bactericidal than the corresponding blood serum. But serum, he says, is ordinarily more so than normal lymph.

But it is well known that chronic œdema predisposes to bacterial invasion. Therefore the œdema of passive congestion should be allowed to disappear, or at any rate to largely decrease, between the periods of treatment.

Promotion of the Absorption of Fluids.—Bier,[2] quoting Klapp,[3] Wölfler,[4] and other authorities, maintains that, although congestion temporarily retards absorption, and sometimes produces œdema, nevertheless the net result of a preliminary congestion, up to about one hour, and the ensuing re-active arterial hyperæmia, is a large increase in absorption.

I have not been able to convince myself altogether as to the value of congestion in promoting absorption. In certain cases, especially with inflammatory swellings, and the swellings caused by gonorrhœal arthritis and peri-arthritis, I have found the œdema and infiltration to rapidly diminish on raising the part during the intervals between the periods of congestion. But whether this was directly due to congestion, or simply the result of the improvement in the general condition induced by treatment, I am unable to say.

Dissolving Action on Solids.—Bier[5] also claims that congestion promotes the resolution of thickenings in joints, tendons, etc., due to rheumatoid arthritis, gonorrhœa, tubercle, gout, etc., and he quotes a remarkable case of gonorrhœal arthritis thus cured.[1] To this action he partially ascribes the improvement in stiffness of joints which congestion effects. Congestion was employed by Ambroise Paré also for reducing excessive callus.[2]

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[1] Hamburger: "Über den Einfluss von Kohlensäure bzw. von Alkali auf das antibakterielle Vermögen von Blut and Gewebsflüssigkeit mit besonderer Berücksichtigung von venöser Stauung und Entzündung," *Virchow's Archiv*, 156 Bd., 2 Heft, p. 329, 1899.

[2] Bier: *Hyperæmie als Heilmittel*, 1906, p. 161.

[3] Klapp: "Über Bauchfellresorption," *Mitteilungen aus den Grenzgebieten, der Medizin und Chirurgie*, 10. Bd., 1 and 2 Heft.

[4] Wölfler: "Über die Einfluss der Esmarch'schen Blutlehre auf die Resorption flüssiger Stoffe," *Langenbeck's Archiv.*, 27 Bd.

[5] Bier: *Hyperæmie als Heilmittel*, 1906, p. 176.

Trophic Action of Congestion.—There is great discrepancy of opinion on this subject. The value of congestion for callus formation in some cases of non-union of fractures has been repeatedly proved. Bier believes that the same principle holds in some cases of inflammation and tubercle, where, he says,[3] the swelling in a few days becomes firm fibrous tissue, and the tuberculous areas rapidly become encapsuled. I have seen no case like this.

The "Auto-inoculation" produced by Congestion.[4]—Recent work by Sir A. E. Wright, Dr. Bullock, Dr. Western, and others, has shown that, in an individual suffering from certain forms of infection, the vascular changes, caused by passive or active movements, massage, electrical treatment, Finsen light, etc., produce a reaction, similar in character to that caused by hypodermic injection of a sterilised culture of the specific micro-organism. Such a process has been termed by Sir A. E. Wright "an auto-inoculation." Now it appears highly probable that the process of congestion, which causes a profound circulatory disturbance in the diseased area, produces in this way an auto-inoculation. The following experiment affords strong evidence in favour of this theory. The patient was a little girl suffering from tuberculous synovitis of the left wrist. Dr. Western first took the opsonic index of the patient towards the tubercle bacillus. I then treated the hand in the suction apparatus in the ordinary way for half an hour. Some time afterwards, Dr. Western again took the opsonic index, and found that it was distinctly raised. Drs. Patch and J. H. Wells have also recorded a series of experiments confirming this observation.[5]

Another argument in favour of this auto-inoculation is the fact that it is by no means uncommon, when one of many diseased areas is treated by congestion, for the other untreated areas to improve simultaneously.

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[1] Bier: *Hyperæmie als Heilmittel,* 1906, p. 177.

[2] *Œuvres complètes d'Ambroise Paré.*

[3] Bier: *Hyperæmie als Heilmittel,* 1906, p. 185.

[4] *The Lancet,* December 2, 1905.

[5] *British Medical Journal,* No. 2403, January 19, 1907, p. 143.

At present we are working in the dark, and the rules for treatment by congestion are empirical, but if this theory of auto-inoculation eventually proves to be correct, a vast field for further research will be opened up, for it may then be possible to ascertain what extent of congestion produces the most effective rise in the opsonic index, and how often this auto-inoculation should be repeated. Treatment by congestion could then be studied from a scientific basis, not only in cases of tubercle, but also in all cases such as gonorrhœa, sepsis, etc., where the specific micro-organism can be isolated, and the diseased area effectually congested. Yet, in spite of the present unsatisfactory state of our knowledge, every practitioner, even though he may have had no previous experience of these methods, can, with perfect safety, undertake this form of treatment, if he will but take the trouble to carry out the simple rules laid down by Bier. These will be given later.

But even if this theory of auto-inoculation by congestion does not stand the test of future investigation, nevertheless it is obvious that this method is a valuable auxiliary to that of the opsonic, or any other, form of treatment which raises the resistance of the blood. For, as Dr. Bulloch[1] has ably pointed out, it is not enough that the resistance of the individual should be high, it is also essential that the blood, or serum, containing the resisting bodies should richly flood the diseased area, thus bringing the micro-organisms and the anti-microbic bodies into direct contact. And this is most effectually accomplished by congestion.

Before going on to discuss the methods of producing congestion, I may point out that the old and well-tried treatment for gout, namely, an incomplete ring of collodion and wool, acts, so far as I can see, in no other way than by causing a passive congestion. I have on various occasions successfully employed this means of congesting a digit.

The following are some of the advantages of treatment by congestion which any practitioner can test for himself: (1) efficiency, (2) simplicity, (3) cheapness, (4) painlessness.

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[1] "The Principles Underlying the Treatment of Bacterial Diseases by the Inoculation of Corresponding Vaccines," Wm. Bulloch, M.D., THE PRACTITIONER, November, 1905.

(3)—METHODS OF PRODUCING CONGESTION.

Congestion may be produced either by means of a bandage proximal to the area to be congested, or by means of what Bier has christened "the suction apparatus."

The Production of Congestion by Bandaging.—The only articles necessary for this purpose, except in special cases, are a light rubber bandage at least two inches in width, and some wool or other padding. Although a light rubber bandage is much the best, an ordinary linen or domette bandage will sometimes be successful.

Several turns of this bandage are superimposed around the limb proximal to the part to be congested, just tightly enough to compress the veins, while the arteries are not at all, or only slightly affected. The part soon becomes congested and the veins stand out. Bier[1] claims that the deeper parts of the limb, even to the marrow of the bone, are congested by this means. Any degree of congestion may be obtained by varying the pressure of the bandage. In most cases, especially when treating elderly or wasted individuals, the bandage should be applied over plenty of padding. This protects the skin, distributes the pressure, and prevents undue pressure on any subjacent prominence. Great care should be taken to have plenty of padding when the bandage is applied above the knee or above the shoulder. For the same reasons the site of the bandage should, whenever possible, be changed frequently. This, except in the case of the shoulder, can readily be done, as the bandage may be applied anywhere, not necessarily immediately, above the affected area. For instance, if it is desired to congest the wrist, the bandage may be placed on the upper arm, and not necessarily just above the wrist.

If, in spite of these precautions, the patient should complain of discomfort due to the pressure of the bandage, the periods of congestion must be curtailed.

With the idea of intensifying the congestion in the diseased part, it has been suggested that the distal portion of the affected limb should be firmly bandaged upwards from the extremity almost as far as the part where it is desired to produce the congestion. I have tried this, but with little success. In a few obstinate cases it has, perhaps, afforded slight additional relief.

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[1] Bier: *Hyperæmie als Heilmittel*, 1906, p. 65.

The hip-joint is the only part of either limb for which no satisfactory method of producing congestion has yet been discovered.

One of the following modifications must be used in the case of the shoulder joint:—The first is that devised and employed by Bier, and is that which I now generally use. Congestion is produced by fixing a piece of stout rubber tubing, a foot or so in length, as a ligature above the shoulder joint. The middle of the tubing is placed in the axilla, and the two ends are drawn up, the one in front and the other behind, and fastened together well up above the shoulder. Any effective clip, *e.g.*, a pair of Spencer Wells forceps, or a strong tie-clip, may be employed to secure the two ends together. I have generally used an ordinary safety-pin with complete satisfaction. This tourniquet is kept from slipping down over the shoulder by a short piece of bandage tied to the tubing in front of the shoulder, passed round the neck, and then tied to the tubing behind the shoulder. It is absolutely essential to have a large amount of wool as padding in the axilla, and also round the shoulder, in order that the direct pressure of the tubing may be somewhat distributed. It is also well to have some padding between the bandage and the neck. Even with ample padding, congestion should not be continued for very lengthy periods, otherwise the local pressure will cause inconvenience, and the site cannot easily be changed.

The second method for congesting the shoulder is as follows:—A domette bandage is applied as a "figure or eight," or "spica," round the patient's neck, and the upper part of his humerus. A pad is first placed in the supra-clavicular fossa, and it is thus attempted to compress the subclavian vein. This method does not appear to me to produce such a satisfactory congestion of the shoulder as does the first-named device. In several cases, however, in which the "spica" method was employed, fairly good results were obtained. It is advisable to employ ample padding also when this method is selected.

Another modification may be employed when desiring to treat an individual digit. This can be effected by applying a ring, or an incomplete ring, of collodion and wool around the base of the digit. The contraction on drying produces a congestion distal to the ring. It has been said that if a complete ring is used the contraction may be excessive, and actually cause gangrene. If the ring is incomplete the pressure is less, and there is no danger of such a disaster. Personally, I have never experienced any evil result from a complete ring, and I feel sure that, if the patient is told to cut the ring at the first onset of pain or paræsthesia, such a dire occurrence could never take place.

Instead of collodion, I have recently employed a small rubber band such as is used to keep papers together. This is much handier than collodion, but care must be taken that it does not fit too tightly.

Mr. W. Ewart[1] has devised a modification of the above method of producing congestion. This, which he terms "interrupted circulation," he recommends for some forms of rheumatoid and gonorrhœal arthritis. He first elevates the limb and strokes the large veins empty. He then applies, over padding, a rubber tourniquet which he removes in half to two minutes. He repeats this manœuvre about six times at intervals of a few seconds. The whole process is carried out twice daily.

General Rules to be observed when employing the Congestion Bandage.—Before congestive treatment is commenced, it is most important to ascertain the nature of the disease, and to vary the technique accordingly, for the correct method of employing congestion in one case might do harm to another, due to a different cause. Consequently, in addition to the following general rules for the employment of congestion, special direction for its use in special diseases will be given under the headings of those diseases. Moreover, it must never be forgotten that the human element has to be taken into consideration.

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[1] "Interrupted Circulation as a Therapeutic Agent, illustrated in two cases of Rheumatoid Arthritis," *Lancet*, August 13, 1904.

When the earlier experiments were being made with congestion, cases were reported in which pressure sores, and even gangrene, had been caused by the bandage. A thick rubber bandage was employed at that time, and patients frequently complained of the painfulness of the treatment. A thin rubber bandage should be employed, and, if the following rules are observed, there can be no possible danger of sores or gangrene.

(1) The bandage should never cause pain or paræsthesia. It should, in fact, cause no sort of discomfort, and the patient should be almost unconscious of its presence. A few patients complain of slight pain for a short time after the bandage has been put on. This soon passes off if the compression is right. Should the bandage be causing pain or paræsthesia at the end of an hour, it should be loosened or removed, but, in any case, no harm can be done in that time.

(2) Œdema usually occurs. This does not contra-indicate further treatment, but it should be allowed to subside during the intervals between the periods of congestion. This absorption may be accelerated by raising the part.

(3) It is a favourable sign when the skin temperature of the congested part is raised by the congestion. This is easy to accomplish in some cases, especially those due to sepsis and gonorrhœa; it is harder to effect in cases of rheumatoid arthritis and tubercle. At any rate, the skin temperature should not be decreased.

In a few cases the part becomes cold, and appears shiny and white, and there is considerable œdema. Bier has termed this condition "white stasis,"[1] and he considers it to be due to lymphatic obstruction. He says that the condition is harmful, and only occurs when either the bandage has been applied too tightly, or the case is not suitable for congestion. Such cases are very rare.

There is occasionally a certain amount of ecchymosis in the congested part, but I have never seen any ill resulting therefrom.

The Production of Congestion by means of the Suction Apparatus.—It is doubtful whether the hyperæmia produced by this means is purely a passive congestion, or whether there is not also an element of active hyperæmia, but there is no doubt whatever that a very marked degree of passive congestion is produced by this method.

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[1] Bier: *Hyperæmie als Heilmittel*, pp. 75, 133.

The principle is to produce a negative atmospheric pressure around the part to be congested, and a marked congestion may be thus effected. The direct result of the negative pressure is enhanced by the fact that the apparatus has to be firmly bandaged on to the limb at some area proximal to that which is to be congested, and thereby the veins are compressed at this area.

The apparatus varies in detail to meet the requirements of the part for which it is intended.

That for the hand or foot consists of a strong glass case, open at one end, the other end closed except for a small tube which leads from it, to which a suction pump may be connected by rubber tubing. A 3-way stopcock is inserted between the glass and the pump to provide for the readmittance of air when the negative pressure is to be discontinued. A sleeve of rubber or other air-tight material is fitted closely on to the open end of the case, and the patient thrusts his hand or foot through this sleeve into the case. The part of the arm, on to which the sleeve is to be fixed, having been smeared with soap in order to make the joint more air-tight, the sleeve is bandaged closely round the arm with a rubber bandage. The air pressure inside the case is then reduced by means of the suction pump. The first effect of this is to draw the limb further into the case, and, if the patient is a child, especial care should be taken that the part is not damaged during the process. The fingers or toes may catch on the side of the case, and the wrist or ankle become excessively bent, or the part may be unduly pressed against the opposite end of the case.

Modifications of this instrument are made for treating knees, and elbows, also for breasts, and for carbuncles, furuncles, etc. For the knee a glass cylinder is used, open at the ends, on to which two sleeves of air-tight material are fixed. The leg is thrust right through these, and the sleeve at the upper end of the cylinder is bandaged on to the thigh, that at the lower end, on to the calf. Exhaustion is effected through a small tube leading from the cylinder.

For breast cases a large bell-shaped glass is employed which fits on to the chest wall all round the breast. If any difficulty is experienced in effecting an air-tight connection, the rim of the glass may be smeared with vaseline. The suction pump is attached to a small tube leading from the apex of the glass. These bells are made in different sizes. A medium size, namely, one 12 centimetres in diameter, I have found most useful.

Similarly shaped, but much smaller, glasses are made for treating carbuncles, furuncles, etc. These small glasses are exhausted by means of a rubber ball fixed on to the tube at the apex. This ball is compressed before the glass is applied, its subsequent release provides the negative pressure.

Many of the instruments described above[1] are very costly; they are, moreover, easily broken, and it takes some considerable time to replace a broken part. I have consequently improvised various instruments, which act just as efficiently as those obtained from Germany, and are also much cheaper, and more easily replaced if broken.

At first I used an ordinary enamelled tin douche-can, fitting on to the open end a sleeve made of common rubber sheeting (a little thicker than such as is used to mend bicycle tyres). This I bandaged very tightly on to the tin with a rubber bandage. By means of rubber tubing I attached the suction pump on to the nozzle of the tin.

This tin was large enough to accommodate the hand and wrist of an adult, or a child's foot. In many ways this device proved quite satisfactory. It is an advantage, however, to be able to watch the limb which is being congested, and so I now use a cylindrical douche-glass[2] fitted up in the same way. The glass is supplied in a tin holder, which, with a piece of board or stick passed through the two handles, makes an excellent protection and stand. I have found this arrangement to be highly satisfactory. It is easily taken to pieces for cleaning and sterilisation, it is easy to make all the connections air-tight, and the whole apparatus is extremely cheap and easily replaced if broken.

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[1] Supplied by F. B. Eschbaum, Bahnhofstrasse, Bonn, Germany.

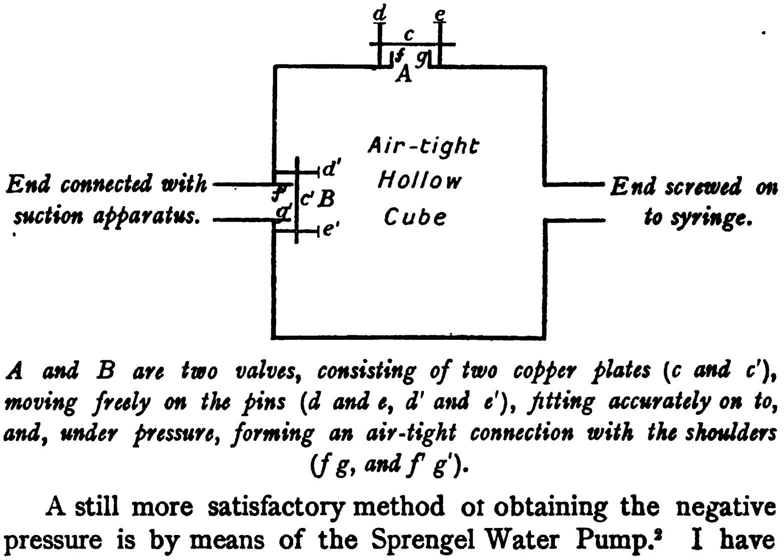
[2] Obtained from Messrs. J. L. Hatrick & Co., 70, St. John Street, Clerkenwell Road. The 4-pint size is, I think, the most useful for general work. This is large enough to accommodate the hand and wrist of an adult, or the foot of a child up to about 8 or 10 years of age.

For the knee, a glass or metal cylinder, open at both ends, may be fitted up in the same way.

For an adult foot, a large glass jar, open at the top, with a bunghole at the bottom, makes an excellent suction apparatus. To the open end a rubber sleeve is attached. The suction pump is connected with the jar through the bunghole.[1]

A good suction pump, which is correspondingly expensive, is supplied by the same firm at Bonn. I have employed some old disused brass syringes fitted with special nozzles, which transform them into suction pumps. These have proved fairly satisfactory, and I have to thank Mr. Gunthorpe, of the London Hospital, for the design.

DIAGRAM OF SECTION OF SPECIAL NOZZLE FITTED TO SYRINGES.


d
e
c
f
g
A
Air-tight
Hollow
Cube
d'
c' B
e'
f'
g'
End connected with suction apparatus.
End screwed on to syringe.

A and B are two valves, consisting of two copper plates (c and c'), moving freely on the pins (d and e, d' and e'), fitting accurately on to, and, under pressure, forming an air-tight connection with the shoulders (f g, and f' g').

A still more satisfactory method ot obtaining the negative pressure is by means of the Sprengel Water Pump.[2] I have only employed this apparatus recently, but I find it more efficient than the brass pump in maintaining an even pressure, and in compensating for any small leak there may be. Moreover, the pressure may be very accurately regulated by the patient himself.

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[1] The cost of the suction apparatus adapted for the foot as supplied by Eschbaum is £5 8s., without carriage, while the glass jar costs about £1 2s., and the rubber sleeve and other fittings a few additional shillings. In the same way Eschbaum's apparatus for the hand costs £3 12s., while the douche glass costs 3s. 6d.

[2] Obtainable from Messrs. Baird & Tatlock, 14, Cross Street, Hatton Garden, E.C., in whose catalogue the article I am now using is listed as "Filter Pump, or Aspirator, No. 1856, price 3s."

To facilitate the production of the necessary negative pressure, it is advisable to lead the water away from the Sprengel pump by a piece of rubber tubing at least 4 or 5 feet long.

The general rule for cases of all descriptions, treated in the suction apparatus, is to apply this treatment for not more than three-quarters of an hour daily, producing a negative pressure for five minutes, then, by means of the stop-cock, allowing the air to re-enter for three minutes, then again reducing the pressure for five minutes, and so on. I generally employ a negative pressure equivalent to a column of mercury from 1 inch to 2 inches in height. The air should not be withdrawn too quickly, for when the pressure is rapidly reduced the patient frequently complains of pain. When the air is slowly withdrawn, and care is taken that the limb slides freely into the glass, the patient does not complain of any inconvenience, unless the negative pressure is raised to more than about 2 inches. For a child I never employ so great a pressure as this. Occasionally, at the end of treatment, the patient says that the treated area feels numb, and tingles a little. I do not think that this, if slight only, is of any great importance, but I try to avoid it. There is often a little swelling for a short time after treatment, but this quickly subsides, and is of no significance. The bandage and dressings should be removed before the affected part is placed in the apparatus, and the wound should only be loosely wrapped in a piece of dry sterile gauze to absorb the exudation, which is often considerable in amount.

By one or other of these methods, congestion may be produced to almost any degree in every part of the limbs, except the hip, or in almost any superficial area of the body. But the dosage is a matter of the utmost importance with congestion as with drugs.

Now the periods of congestion are easily regulated by the time, but the degree of congestion is by no means an easy matter to standardise. It is only after some experience that the knack is acquired of adjusting the bandage correctly, and; in the case of the suction apparatus, I believe it to be impossible to regulate the negative pressure with anything approaching accuracy without some mechanical aid, for a minute leak in the apparatus would upset the most skilful calculations. This appeared to be highly inaccurate and unscientific, and consequently, with the help of Dr. Western, I fitted up a mercurial manometer,[1] and, inserting a T-piece between the suction apparatus and the stop-cock, connected the third limb of this to the manometer. The negative pressure may now be accurately measured, and the smallest leak detected.

Of course it does not follow that the same negative pressure will produce the same degree of congestion in different individuals, but this fact does not lessen the value of this means of standardisation.

I have been unable to devise any satisfactory means of standardising the congestion bandage. The requisite tightness naturally varies in different cases. After applying the bandage, it is always advisable to insert the finger under it in order to form an estimate of the pressure.

Choice of Method to produce Congestion.—I have treated cases of rheumatoid and gonorrhœal arthritis, gout, tubercle, sepsis, and mastitis, by one or other, or both, of these methods, and the points which influence the choice of method deserve consideration.

For rheumatoid and gonorrhœal arthritis, and for gout, congestion is employed for hours at a time, and the bandage is obviously the only suitable method. On the other hand, for tubercle of the bones, joints, tendon sheaths, etc., lengthy periods of congestion should never be employed, but the part may be congested for a short time daily by either method. It is immaterial whether the tuberculous lesion is open or closed, or a pure or mixed infection. For open lesions I prefer the suction apparatus, because the negative pressure helps to draw out the tuberculous material in a painless manner. For small children the bandage is the only practicable method. In other cases I have not been able to convince myself that one method has any advantage over the other.

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[1] This can be very easily made by bending a piece of ordinary glass tubing into the shape of a U, half filling this with mercury, and then fixing it on to n upright stand with a scale in inches.

I had hoped to come to some conclusion on this point by observing the results of treatment on a man suffering from tuberculous tenosynovitis of both wrists, one of which I treated in the suction apparatus, the other with the congestion bandage. But my calculations were upset by the patient's irregular attendance.

For acute sepsis, continuous congestion is required, and the bandage is the more serviceable for this purpose. If there is a discharging wound, the suction apparatus may be employed for a short time daily in order to help to clean up the wound, the bandage being replaced afterwards.

On the value of congestion for cases of chronic sepsis, the opinions of various authorities are rather conflicting. The balance of opinion seems to point to the view that in such cases, congestion is generally of value, but that it does not cause such striking improvement as in the case of acute sepsis. Personally I have not had sufficient experience to express an opinion on this question.

Cases of mastitis, which do very well with this treatment, can only be congested by means of the suction apparatus.

(4)—OBJECTIONS TO THE USE OF CONGESTION.

As with innovations of all sorts so with the introduction of treatment by congestion. Many of the old school doubt its efficacy, and enumerate theoretical objections to its employment.

Perhaps the objection most frequently brought forward is the alleged painfulness of the treatment. But the grade of congestion recommended never causes, but very sensibly allays, pain. If pain, or even paræsthesia, is produced, the bandage is too tight, and the operator is at fault.

The most serious allegation against congestion is that of causing pressure sores and gangrene. The former was certainly experienced when this treatment was first tried experimentally, a thick rubber bandage being used. Since employing a broad, soft bandage, and plenty of padding, and resting the skin as soon as it becomes at all tender, there has been no serious trouble in this way. As for gangrene it can only occur with the grossest ignorance of the technique, in which circumstances, all remedies are dangerous. If Bier's rule that a congestion bandage for lengthy application must never cause even discomfort or paræsthesia is only approximately followed, there is no possible danger. Bier states, however, that congestion is inadvisable in cases of threatening senile or diabetic gangrene.[1] And congestion should certainly be employed with caution i the congested part is for any reason anæsthetic.

In addition to this tendency for the pressure of the bandage to produce tenderness of the skin, etc., I have met with three other difficulties in connection with treatment by congestion.

One of these consists in the pain and increase in size o varicose veins in some cases treated in this way. It is, I think, only when prolonged congestion is required that this difficulty is experienced, for other patients, suffering at the same time from varicose veins, have been treated with congestion for shorter periods with no apparent evil results. Possibly, had I firmly supported the veins with a bandage, I should not have experienced this difficulty.

Another case, in which congestion appeared to do harm, was that of an old man suffering from rheumatoid arthritis and psoriasis. The psoriasis rapidly spread on the limb undergoing congestion. Such cases, however, must be rare.

The third difficulty I have met with only in a few highly neurotic individuals. These persons complained of the "irritation" of the bandage. One of them, an educated man, refused to continue the treatment on account of this "irritation" of the bandage, which I had purposely applied very loosely. Yet he expressly stated that the sensation did not amount in any way to pain.

The following peculiar phenomenon, for which I am totally unable to account, seems to fall naturally into place here, though it can scarcely be termed an "objection to congestion." Several patients have attempted to describe to me a curious "sensation" which they experience a short time after congestion has been produced. This "sensation" lasts only for a short time, but while it is present the patient feels obliged to sit down, and feels unable to work or read. In a short time the "sensation" passes off, and the patient is able to go about as before. At first I thought that this feeling was probably the result of some vaso-motor effect due to the vascular disturbance caused by the congestion. But I have been unable to obtain any evidence that such is the case. Owing to this suspicion, I was at first unwilling to treat by congestion the rheumatic pains of an old man (C. B., aged 72), suffering from considerable cardiac failure, who had heard that I was interested in rheumatoid arthritis, and desired to have this new treatment. I subsequently applied the congestion bandage above the shoulder carefully noting the results. The patient although questioned on the subject did not complain of any unusual sensations, I was unable to trace any result on the general cardio-vascular system, and the pain in the arm was relieved.

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[1] Bier: *Hyperæmie als Heilmittel*, 1906, preface.

I do not believe that the phenomenon mentioned above can be attributed to neurasthenia, for several of those, who experienced the feeling, were by no means of a neurotic temperament. In no case, however, have I found it to be of any importance, and I merely refer to it as an interesting, and to me a totally inexplicable, occurrence.

Although I have frequently attempted to investigate this phenomenon by congesting my own limbs, I have failed to produce any unusual sensations like those just described.

(*To be continued.*)

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THE GENERAL PRACTITIONER AND DEAF MUTISM.[1]

By DUNCAN MATHESON MACKAY, M.D.,

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I HAVE ventured to couple the general practitioner with deaf mutism, because, after all, the problem of deaf mutism is really a problem for the practitioner of general medicine rather than for the practitioner of aural surgery. The victim of deaf mutism may, in the end, come to one who professes a specialty, but it is usually at a time when no help, of the kind he seeks, can be given him. Standing, as he does, between two, the general practitioner and the educationalist, the aurist has too often to confess that he is helpless. Whoever saw the patient earlier might perhaps have done something, now there is no man to help but the schoolmaster.

For, sorrowfully, one must admit, deaf mutism is most frequently incurable. There is only one method, by which it can be treated with any reasonable hope of success, and that is,—as an Irishman might say,—by treating it before it is there to treat. Which saying is but another way of asserting that, while deaf mutism is, as a rule, incurable, it is, not seldom, preventable.

And of all the practitioners of medicine and surgery, the general practitioner is the one who can do most to prevent it. It is his advice that the public acts upon, when it acts upon expert advice at all in things pertaining to health, and it is his aid that the afflicted public seeks first, when it awakens to a sense of its aural disabilities.

Such being the position of affairs, I am taking it upon me to put together a brief statement of the present views as to the causation of deaf mutism, and a summary of the more important findings in its morbid anatomy and pathology. In doing this, I shall draw largely upon the collected evidence and views, comprised in two volumes, of Kerr Love of Glasgow,[1] and Mygind of Copenhagen.[2]

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[1] A Paper read before the Hull Medical Society.

DEFINITION.

By deaf mutism is meant deafness and dumbness coexisting. The exact degree of the deafness varies with different individuals, but, practically, it may be stated to be that degree, which is sufficient to prevent the sufferer from hearing the voice as used in conversation and teaching. Now, as speech is ordinarily learned by a child's hearing the speech of others, and imitating it, the result of deafness of this degree is that, not having any model for speech to imitate, the child does not learn to speak at all.

In deaf mutism, therefore, with few exceptions, the organs of speech are all present and perfect,—they simply stand idle for want of incentive to function, an incentive which should come, as I say, through the ear.

There are, it is true, dumb children who are not deaf. An annotation in the *Lancet* of 1906,[3] described such cases, and attributed the condition to a lack of normal brain spontaneity that can be co-ordinated in imitation of movements. Other speechless individuals who hear, may be simply manifesting what is clinically known as aphasia; while others may be speechless from disease or destruction of the speech organs. These obviously are not deaf mutes.

On the other hand, there are deaf people who can speak. But either they have become deaf after they learned to speak,—and it is a matter of experience that, if deafness does not come on, in a child of average intelligence, before the age of 7, he will usually retain the speech he has already acquired, and even add to it;—or, if the deafness developed earlier, then the speech is the result of special training.

So defined, then, deaf mutism is not a precise scientific entity, for some deaf mutes can hear something; and some deaf mutes can speak, or utter sounds. It is right, therefore, to speak of *total deaf mutism,* in which the victims are irresponsive to every auditory sensation, and *partial deaf mutism,* in which they can, not only make out noises, but also, it may be, words, if they are spoken loudly.

The latter, the partial deaf mutes, are the more numerous by a long way. Kerr Love's observations led him, in 1896, to the view[4] that not more than 7 to 20 per cent. of deaf mutes are quite deaf to sounds conducted through the air, while only a still smaller proportion are quite deaf to sounds conducted by bone; and that hearing for speech, to a useful extent, exists in from 10 to 27 per cent.

MORBID ANATOMY AND CLINICAL FINDINGS.

On deaf mutism there is a considerable amount of evidence available, extending from the time of Herodotus,[5] and including records of examinations made with the speculum and tuning-fork, and of post-mortem dissections. Of the latter, the later records are naturally the more valuable, because until methods of precision came to be applied to the examination of delicate organs like the inner ear, the findings could be in no sense complete.

I shall hurriedly run over the more important points contained in these reports, and refer, at the same time, to those which any of us may observe in a clinical examination of a deaf mute. The abnormalities that are not often seen can quite well be passed over.

(*a*) *External Ear.*—The obstructions from various causes that may be present in the external ear are not in themselves of moment, but they may be of value in suggesting the possible presence of deeper malformations.

(*b*) *Middle Ear.*—The middle ear, however, is frequently profoundly altered, but by no means always. In regard to the membrana tympani, for example, a large number, even 30 to 50 per cent., are normal;[6] in many others the abnormalities are of comparative unimportance, being such as are usually found associated with the presence of enlarged tonsils and post-nasal growths. In a minority of cases, there is evidence of past or present suppurative disease, perforations, more or less complete absence, scars,[6] and calcareous deposits.

Further, the ordinary contents of the middle ear, the ossicles, muscles, ligaments, etc., often show destructive changes. All the ossicles may be absent, or two, or one. More frequently ankylosis of the ossicles has occurred, either bony or fibrous. The stapes is the bone most often affected, and has been found ankylosed in the fenestra ovalis in one-eighth of all the dissections.[7] This is similar to the condition which Politzer has demonstrated in the disease formerly known as "dry middle ear catarrh," but now called "otosclerosis."

The inner wall of the middle ear, which is also the outer wall of the inner ear, is, however, the most noteworthy, and here are found the most frequent seats of abnormalities. It is in this wall, you remember, that the two windows, the fenestra ovalis and the fenestra rotunda, are situated, opening, in the dry skull, into the vestibule of the labyrinth and into the cochlea respectively, from which in health, however, they are separated, in the case of the fenestra ovalis by the foot-plate of the stapes and its ligament, and in the case of the fenestra rotunda by the secondary tympanic membrane. On this wall, too, is the promontory of the middle ear, caused by the projection of the cochlea; and behind and above the fenestræ are areas corresponding with the semi-circular canals. It is the round window, or the niche leading to it, that one most commonly finds affected; perhaps it is wanting, or filled up by osseous masses. Indeed, one-fourth of all the dissections, which have yielded positive results, exhibited anomalies in and around the fenestra rotunda. The oval window also may be similarly affected, though it is not closed so frequently, except in the cases of ankylosis of the stapes.

The middle ear cavity, including the mastoid cavity and the Eustachian tube, may be occupied by deposits of osseous and other masses; and the other boundaries of the middle ear and the walls of the mastoid may have undergone destructive changes.

Nearly all these middle ear conditions are explicable as the result of inflammatory processes, catarrhal sometimes, but generally suppurative, and then of a peculiarly destructive type.

(*c*) *Inner Ear.*—In investigating the changes in the inner ear, one can use only the method of post-mortem dissection, except in quite exceptional cases. Either the whole of the labyrinth, or only a part may be the seat of abnormality. If only a part is affected, it is most commonly the semi-circular canals, next comes the cochlea, and least often it is the vestibule. More than half the dissections, yielding positive results, show changes in the semi-circular canals,[8] while, in a fifth of such dissections, they are the only part of the labyrinth affected.[8] This is somewhat surprising, when one remembers that the chief function of the semi-circular canals is equilibration, not audition.

The abnormalities present may be entire absence of the part concerned, either as the result of defective development, or, according to Mygind,[9] through replacement of the normal structure by bony tissue resulting from an otitis intima. Or the cavities may be filled with caseous or calcareous masses or fibrous tissue; or they may be reduced in size by hypertrophy of the walls, bony or periosteal; or increased in size by atrophy of the walls or destruction of the contents. In other cases, the osseous labyrinth may be normal, while the membranous labyrinth is the seat of the abnormalities—absence or alteration.

(*d*) *Auditory Nerve.*—Leading to the inner ear is the auditory nerve, and this also is frequently affected in deaf mutes. It may be completely absent. Michel[10] recorded a case in which there was no trace of it right up to the interior of the fourth ventricle; as the internal auditory meatus was so narrow as only to admit of the facial nerve, and the labyrinth was entirely lacking, it is probable that this was a congenital absence of the nerve, with consequent non-development of the labyrinth. In other cases, the nerve has been present but attenuated; while, occasionally, there have been abnormalities at the origin of the nerve, for example, complete absence of the striæ acusticæ.[11] Of all the nerve changes, however, the most frequent is complete or partial atrophy or degeneration of the trunk or its branches; indeed, one-eighth of all post-mortem examinations which have given positive results show this change.[11] It is to be noted, however, that, though in many cases of deaf mutism the auditory nerve has been functionless for so long, it is not always atrophied.

(*e*) *Central Nervous System.*—Finally, one finds that the central nervous system is but seldom affected in pure deaf mutism; and though changes have been found in the fourth ventricle, cerebellum and cerebrum, it is doubtful whether they could have any causal connection with the deafness.

PATHOLOGY.

Now, how does the pathologist explain all these changes?

Obviously, the destructive changes in the middle ear are similar in kind to those we regularly see in chronic suppurative otitis media. Other of the changes are like the results of non-suppurative affections of the ear, and many of them appear to date from an early period.

As to the abnormalities in the inner ear, a great number of them are to be explained by the exceptional severity of the middle ear affection, leading to extension inwards. Those who were present at the meeting of the British Medical Association at Exeter last year (1907) would note that Dr. Milligan, during the course of a demonstration on Labyrinthine Suppuration, indicated that the vast majority of cases of labyrinthine suppuration are secondary to septic disease of the middle ear though in only from 1 to 2 per cent. of cases of chronic septic otitis media does labyrinthine infection result.[13]

If the disease, suppurative or non-suppurative, is especially marked on the inner wall, it may lead to the deposit of fibrous tissue, and then of osseous tissue, in the niches of the fenestræ; these, as a result, become functionless, and sound waves are no longer transmissible to the perceptive apparatus.

But if the inflammatory process is destructive, as it often is, inflammation and suppuration may spread through the fenestræ, or through the promontory, or through some fistulous track in the external semicircular canal, into the labyrinth itself. If the attack is acute enough, death may be the result; if it is not so acute, inflammatory deposits may be made in the labyrinth, and these, becoming transformed into osseous tissue, obliterate, in part or in whole, the cavity or cavities concerned.

On the other hand, the labyrinthine condition may be due to spread from within the cranial cavity. Meningitis, for example, extending along the internal auditory meatus, may lead to changes in the labyrinthine spaces similar to those set up by inflammatory processes in the external parts. So, in this way, too, osseous deposits may occur in the labyrinth, and abolish the function of the auditory nerve endings.

ANAMNESIS.

The date, at which these various changes make their appearance, cannot usually be ascertained. Mygind states emphatically that, in post-mortem examinations, it is often a matter of impossibility to decide between congenital changes and those acquired after birth.[13] The ear and brain are exposed to inflammatory attacks *in utero* as well as after birth, and similar thickenings and deposits may follow. So one is driven to the question of the history of the deaf mute, in order to obtain information as to whether a particular case has been congenital or acquired.

How long has the deafness existed? From birth? Or did it come on during infancy, or early childhood? Nearly always the mother's observations are the only observations available, in regard to these questions. And though any single report may be untrustworthy, in all probability the sum total of reports may be accepted as moderately correct. For, to quote Kerr Love,[14] though the difficulties of finding out how long the deafness has existed are often great, it yet happens that the mistakes affect the totals in opposite directions. An infant, whose congenital deafness has not been recognised, may have, within a few months of birth, a severe illness, and this illness may be supposed to have caused the deafness. On the other hand, an infant with good hearing may, almost from birth, have an insidiously coming-on deafness, which, when it is recognised, is supposed to have always been present. Taking one with the other, therefore, it is probably safe to accept the modern estimates, which ascribe about 50 per cent. of deafness to congenital causes, and about 50 per cent. to acquired. Inquiries made by Love and Addison, about 12 years ago, amongst a large number of English schools for the deaf, led them to the opinion that an average of 60 per cent. had been born deaf. Bezold, in his book on *Deaf Mutism*, published in 1902, records that out of the deaf mutes, who had passed through his hands in Munich, 100 were congenital, and 119 acquired.[15] Of 10 deaf mutes, of whom I have records during the present year, five were said to be congenital, and five acquired.

(*a*) CONGENITAL DEAF MUTISM.

Now, when one examines the history, and also the family history, of the congenitally deaf, one finds two facts, which occur sufficiently often to be considered in the light of effective causes of deaf mutism, viz., heredity, and consanguinity of parents.

(1) *Heredity.*—The opinions of authorities upon heredity as a cause of deaf mutism vary widely. Kramer, of Berlin, whose work on *Aural Surgery*, in 1863, is amongst the publications of the New Sydenham Society, said,[16] categorically, "Deaf mutism is not a hereditary disease." It is a British aurist, the late Sir William Wilde, of Dublin, who lays most stress upon the hereditability of deaf mutism,[17] and this is the view that is coming to be widely held.

Perhaps the difference in the conceptions of heredity, held by the different observers, accounts for the divergent opinions. It is undoubted, for example, that extremely few deaf mutes are the children, immediate children that is, of deaf mute parents. The latest testimony available, Bezold's, is in accord with former authorities, to the effect that among all his cases of congenital deaf mutism, not one was an instance of direct hereditary transmission. My own experience of 11 cases of deaf mutism seen this year, concerning whom I inquired on this point, gave one case of deaf mutism with deaf mute parents.

But if one includes, under the idea of heredity, not only the direct ancestry, but also the collateral family tree, one finds that repeatedly the abnormality of deaf mutism appears. It is least frequent in the direct ascending line (grandparents, parents); more frequent in the collateral branches (great uncles, great aunts, uncles, aunts, grandparents' cousins, parents' cousins, cousins, and second cousins); and most frequent by far among the brothers and sisters of the deaf mute.[19] Mygind's Danish records, referring to over 500 deaf mutes,[20] show that about one-fifth of the whole had deaf and dumb brothers and sisters, and about one-fifteenth had deaf and dumb relations in more remote degrees. The last fact may be stated in another way, namely, that there was one deaf mute relative (parents, brothers, and sisters not included) to every sixteenth deaf mute. Certainly deaf mutism is not so common amongst the relatives of normal persons as that.

Various considerations may influence the heredity of deaf mutism, just as they influence the heredity of other abnormalities. "The special character of the parent is not uniformly transmitted to the offspring,"[21] it may be present in only a few of them, or an entire generation may be unaffected.[22] This is in accordance with the theory of reversion to the character of a more remote ancestor. Other considerations, which we know little or nothing of, may influence the appearance or suppression of deaf mutism. In the section of Pathology of the British Medical Association, meeting in 1905 at Leicester, Dr. C. J. Bond[22] presented a note in which he compared deaf mutism as a hereditary disease with hæmophilia, and illustrated, by genealogical trees, the point, that when deaf mutism crops up in a family, it tends to affect one sex only in any one family. In calculating, therefore, the chances of deaf mutism in a family, in which it is to be feared, our view must not only include the immediate progenitors, but the whole family antecedents on both father's and mother's side, "for the hearing members of a deaf mute connection send down the tendency to deafness with as great certainty as the deaf members."[23]

2. *Consanguinity of Parents.*—This, like heredity, is a much disputed matter, some authorities asserting that it has no deleterious influence, while others, prominent amongst whom is Wilde again, claim that it is paramount amongst the predisposing causes of deaf mutism. Those who contend for the harmlessness of consanguinity, point to the admirable results of inbreeding amongst domestic animals. The conditions, however, as Kerr Love[24] shows, are not similar in the two cases. For amongst sheep and cattle, the animals used are perfect specimens; in the case of man, the individuals have practically always some ill condition or tendency. It may be that it is these inherent weaknesses that lead to the bad results, and not the consanguinity *per se*, and this is the view stated by the Glasgow aurist.[25] In practice, the evil influences predominate in nearly all such unions casually arranged, and probably, he thinks, one must look upon the appearance of deaf mutism as only an example of degeneration, ranking therefore with other signs of degeneration in a family.

Sir Arthur Mitchell,[26] whose investigations were made in 1865, speaking of deaf mutism, after he had examined over 400 deaf mutes, stated that 1 in every 16 had parents who were blood relations. If, said he, cousin marriages have no influence in the production of this result, then such unions in the general community ought to be to others in the proportion of 1 to 17. Such a proportion must be too great; the average for Great Britain is probably not more than 1 to 60 or 70.

Mygge,[27] working in Denmark, says that in that country consanguineous marriages may be supposed to represent about 3 to 4 per cent. of all marriages, yet 6·75 per cent. of deaf mutes, admitted into the Royal Deaf and Dumb Institution in Copenhagen, were the result of such marriages.

It is a striking fact that deaf mutism is more common amongst Jews than amongst Protestants or Roman Catholics, and that it is more common amongst Protestants than amongst Roman Catholics. This coincides with the customs that prevail amongst these different religionists in regard to marriages; for amongst the Jews intermarrying largely obtains; Roman Catholics, however, discourage the marriage of cousins, while Protestants, as is well known, permit such marriages.

Interesting examples of communities, which lend support to either view, as to the influence or non-influence of consanguinity of parents in producing deaf mutism, are cited by Kerr Love.[28] The island of St. Kilda, for example, where intermarrying has gone on for centuries, is said to have no history of any case of deaf mutism. Martha's Vineyard, on the other hand, an island in the southern part of Massachusetts, is an example of the opposite condition, for there, out of 500 inhabitants, in 1880, there were 20 deaf mutes.

A possible explanation of these anomalies, an explanation which I have never seen referred to before, may perhaps be found in a more exact investigation of the relationships of the parents. It was suggested to me through reading a paper[29] about 12 years ago by Mr. Basil H. Thomson, now Governor of H.M. Prison at Wormwood Scrubs, in which were described in detail the marriage customs of the Fijians. It appears that cousin marriages in Fiji are considered from two aspects:—

(1) Where the contracting parties are the children of two brothers, or of two sisters;

(2) Where the contracting parties are the children of a brother and a sister respectively;

and Mr. Thomson showed, in his paper read before the Anthropological Institute, that "from the Fijian point of view, the relationship between children of two brothers, or of two sisters, is exactly the same as the relationship between children of the same parents," and therefore marriage between two such children is strictly forbidden. On the other hand, cousins of opposite sex, of whom the father of one is brother to the mother of the other, are said to be "concubitants," that is to say, marriage between them is not only encouraged, it is obligatory. Mr. Thomson then detailed his examination of the census figures, taken with a view to the study of results of Fijian marriages, from which he found that, as to both fecundity and vitality of offspring, the marriages between concubitants are greatly superior to those between relations (not concubitants), or between fellow-townspeople (not related), or between natives of different towns. In contrast with this, it appeared that, as to fecundity and vitality of offspring again, marriages between relations (not concubitants) are greatly inferior to those of any other class.

This consideration, applied to the investigation of deaf mutism, means the preparation of entirely new statistics; and if this is done, it may reconcile the present discordant opinions.

If this position is accepted, namely, that about 50 per cent. of the cases of deaf mutism are the result of marriages, either—

(1) amongst those who have cases of deaf mutism in their families, either direct or collateral, or

(2) amongst those who are blood relations,

it is the duty of general practitioners, a duty which they will not seldom have an opportunity of practising, to do all in their power to discourage such marriages. This is, of course, a counsel of perfection, but there *are* people amongst the deaf, as amongst the hearing, who are prepared to sacrifice their pleasure to their duty in this respect, if only they know clearly what that duty is. Others, of course, will not hearken to us or to anyone else, and as at present the State is not ready to forbid such marriages, we are all more or less helpless. All that we can do therefore is, as Kerr Love concludes,[30] to see distinctly before us the goal to be attained to, and try to encourage others to aim at it also.

(*b*) ACQUIRED DEAF MUTISM.

So much for the congenital deaf mutes. What, finally, about the 50 per cent. of acquired cases of deaf mutism, that is to say, the cases of deaf mutism who began life hearing, and possibly attained a slight degree of speech, but who, as the result of some disease which occurred early in life, became deaf and dumb?

(1) BRAIN diseases play an important part in the origin of deaf mutism. Hartmann[31] attributed 38·8 per cent. of the cases to brain disease; modern British statistics give 24 per cent.[32]

Of brain diseases, the most potent undoubtedly are *meningitis simplex* and *epidemic cerebro-spinal meningitis.*[33] They both act by spreading outwards from the original seat of the disease to the labyrinth; occasionally, the epidemic disease produces a preliminary inflammation of the middle ear. In epidemic cerebro-spinal meningitis, it appears that usually the invasion of the labyrinth occurs suddenly, and in the course of the first two weeks,[34] and it is probable that the disturbances of equilibrium, which are present, are due to the inflammatory processes in the semicircular canals.

(2) Next to brain diseases come acute infectious diseases, in which category, of course, epidemic cerebro-spinal meningitis may be included. Of the others,—

Scarlet Fever is far and away the most virulent, statistics varying from 7 to as high as 42 per cent. in accordance with the areas from which they have been obtained.[35] Scarlet fever causes deafness by inflammation of the middle ear, of a type having a marked tendency to destroy the mucous membrane and osseous walls and contents of the tympanum. This middle-ear inflammation arises most frequently by propagation through the Eustachian tube, but may appear independently. From the tympanum, the inflammation may spread through the fenestræ, or by way of the vessels, to the labyrinth, and cause a partial or total destruction of the membranous contents of that organ. It is said that the period, when the deafness shows itself in the majority of cases, is the period of desquamation.

Measles, to which are attributed 1·4 to 8 per cent.[36] of deaf mute cases, acts in a similar manner to scarlet fever. Perhaps more often, however, the labyrinthine disease may develop independently of middle-ear inflammation.

Diphtheria, though not often mentioned as a cause of deaf mutism, may possibly be the forerunner of some of the cases, and its non-mention may be because it has been of a type so mild as not to be recognised.

Small-pox, *Chicken-pox*, *Erysipelas*, *Influenza*, *Whooping-cough*, *Mumps*, and *Typhoid Fever* have all been answerable for occasional cases of acquired deaf mutism.

(3) Finally, some CONSTITUTIONAL DISEASES may be the origin of deaf mutism. Of these syphilis is to be especially mentioned, for, though few cases are attributed to it in statistics, some observers, including Sir Wm. Dalby, think that it is a common cause of the condition.[37]

The practical outcome of the perusal of these causes of acquired deaf mutism is evident, and there is no need to emphasise it:—The acute infectious diseases come to us for treatment, and in many cases, not in all, we can do something, as we are doing, to prevent the extension of throat and nose inflammations to the middle ear; and, where the middle ear has become invaded already, something to check the destructive processes, which are so liable to follow, and also the involvement of the inner ear. But we all know well that, in spite of all treatment, in many cases the ear cannot be saved.

And so the end of this article is simply a "word to the wise." Give attention to the treatment of all diseases of the ear, and especially to those occurring in the course of the general diseases, which at times leave such disastrous results.

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NOTES FROM FOREIGN JOURNALS.

ASTHMA, DYSPNŒA, AND STOMACH-COUGH.

In a clinical lecture at the Hôpital Tenon, Leven drew attention to the frequent occurrence of cases of asthma, of dyspnœa, or of cough which are really dependent upon dyspeptic conditions. After discussing the pathogeny of these affections, he quoted several observations of patients who had been relieved, simply by gastric treatment, of their cough, or their asthmatic or dyspnœic troubles. Treatment must mainly be directed against the dyspepsia. When the symptoms of this are not very marked, it is sometimes sufficient, in order to relieve the patients, to prohibit bread, wine, and sundry indigestible foods, such as cabbages, beef, uncooked foods, salads, vinegar, and spices. In some cases it is necessary to forbid meat. Vegetarian diet is kept up for fifteen to thirty days, and then, for several weeks, a small quantity of meat is allowed. The vegetables are given in *purées*. Warm drinks should be taken with the meals. The food must be thoroughly masticated, and after each meal a rest should be taken on a long chair. Anti-asthmatic remedies, the iodides for instance, are useless. If the patient has an asthmatic attack, warm drinks are given, and poultices and wet compresses applied to the abdomen and thorax. The irritability of the stomach can be allayed by syrup of codeia, one teaspoonful a quarter-of-an-hour before each meal, or by allowing the patient to take every three hours through the day, and at night, if he is sleepless, a pinch of this mixture:—

℞	Cretæ Preparatæ - - - - - -	ʒiss.
	Bismuthi Subnit. - - - -	℥j.

Misce. Fiat pulv.

Mineral waters are harmful when dyspepsia is present, but useful when it is relieved.—(*La Tribune Médicale.*)

CAMPTODACTYLIA.

In a clinical lecture at the Hôpital Laënnec, Professor Landouzy remarked that, in clinical medicine, there are no little facts; those least in appearance are often of great significance. One of such small facts, to which he wished to draw attention, had forced itself upon his notice for many years as being of the nature of an organic stigma, to which he had given the title of "camptodactylia." It is a small deformity, fairly frequently seen, in the terminal phalanges of the hand. These are flexed upon the middle phalanges, which are in turn flexed upon the proximal phalanges. These last remain unaffected in the axis of the metacarpus. According to the degree of flexion, there is a more or less marked incurvation of the little and ring fingers, which cannot in consequence be folded into the palm. The permanent crook of these digits sums up the whole disease. The palmar fascia is quite free; the hollow of the hand is not affected; the skin is smooth and without the least fissure. The lesion, therefore, has nothing in common with Dupuytren's contraction, and it is equally removed, in appearance and pathology, from chronic rheumatism. The deformity affects the little and ring fingers, very rarely the middle, and never the index finger and thumb. The bent condition of the fingers is permanent, and the patient is unable to straighten them by voluntary effort. If the hand is placed upon a plane surface, it is impossible to apply the whole of its surface to the plane; at the level of these two inner fingers a small tunnel exists, under which sometimes a pencil can be passed. The affection is painless and causes no redness. It is of insidious development, and is accompanied by so little inconvenience that most people suffer from it without worrying themselves about it, or even suspecting it. Consequently, it frequently passes unnoticed by the medical man. Landouzy has looked for this symptom for four-and-twenty years, and, rightly or wrongly, attaches importance to it. Those who present the symptom are arthritic, and in their pathological history will be found a proneness to congestions, epistaxis, marginal erythema, and, in women, painful and excessive menstruation. Their biography can be written in advance. The deformity is not only pathognomonic of arthritism, but is an early symptom, for Landouzy has traced it back as far as early childhood. It is more common in women than in men, as is the case with biliary lithiasis, mitral constriction, and obesity. In this it differs completely from Dupuytren's contraction, which is very exceptionally found in women, and, moreover, occurs in those who make particular use of their hands in their work, such as carpenters and other workers with tools. No such connection exists in the case of camptodactylia, and Landouzy insists upon the fact that these two affections are totally different from each other, and not, as has been suggested, of the same nature.

When the affected fingers are dissected or examined by the X-rays, no alteration is found in the bones, the ends of the bones, or the articular surfaces. There is a slight thickening of the ligaments, which is quite distinct from the pathological appearances found in chronic rheumatism. For these reasons, Landouzy makes a point of examining the hands of all his patients, being convinced that a medical man should always endeavour to get a knowledge of the earliest indications of disease rather than wait until the symptoms are unmistakable. Early diagnosis is very often the only one of real usefulness. To make a diagnosis of cirrhosis of the liver when the abdomen is big with ascites (frog-bellied), and the abdominal veins are prominently enlarged, is not of great interest to the practitioner, and is of little use to the patient.—(*La Quinzaine thérapeutique.*)

THE PAINFUL ABDOMINAL CRISES IN HENOCH'S PURPURA.

Vieillard has made a special study of the painful abdominal crises of special character, which precede, or accompany, purpura, the knowledge of which is specially useful in view of the errors in diagnosis which they may occasion. In his Paris thesis, he has embodied his own observations, made under Guinon and Boulloche, with the cases already recorded in medical literature. These crises are the distinctive feature in *purpura rheumatica*, which occurs in children and young adults, and are not met with in infectious purpura, fulminating purpura, and Werlhof's disease (*purpura simplex*). Schönlein described three characteristics: (1) a purpuric eruption on the skin; (2) pain and swelling in the joints; (3) gastro-intestinal disturbances. The last-mentioned, often insignificant in themselves, are merged in the form accompanied by gastro-intestinal crises, which present the following characters: (1) violent abdominal pains, frequently of extraordinary intensity; (2) frequent vomiting, sometimes uncontrollable, the ejecta being often blood-stained and sometimes fæcal; (3) bloody stools, dysenteric in character. These three symptoms occur in paroxysms, beginning and ending suddenly. In some cases, the diarrhœa is replaced by obstinate constipation. Other symptoms of less constant occurrence are, *facies abdominalis*, belly retracted or meteoric, and a "peritoneal" pulse. When these are present, they accentuate the likeness of the attack to peritoneal or abdominal lesions. The crises have a great tendency to recur for weeks, months, and even for years. They are coincident with the skin-eruption, but may even precede it by several hours, sometimes a few days, suggesting that there are crises of the same sort in cutaneous purpura. They recall the analogous crises met with in the course of acute local œdema, and of urticaria; skin affections which often accompany purpura rheumatica. As a rule, in spite of their apparent severity, the patient gets well, but two rare, though very serious, complications may occur; peritonitis from perforation and intussusception. Diagnosis, easy as a rule, is extremely difficult in some cases, especially when the crisis precedes, by some time, the appearance of the exanthem. They may be mistaken for lead colic, gastric crises in tabes, hepatic colic, poisoning, appendicitis, peritonitis due to perforation in stomach or appendix, intestinal obstruction, and, especially, intussusception, by reason of the bloody motions. In the last mentioned, diagnosis is the more difficult because the intestine may actually become invaginated in the course of purpura itself. Several useless laparotomies have in consequence been performed. The pathogeny of these crises is still obscure, but two theories have been put forward in explanation. One supposes intestinal and peritoneal purpura; hæmorrhage into the substance of the intestine has been actually demonstrated in post-mortem examinations and laparotomies. The other theory looks upon them as being a neurosis, probably of toxi-infectious nature, which is by some localised in the cord, and by others in the sympathetic (solar plexus). Both are plausible, but a decided opinion is not really possible. For treatment the frequent use of morphia is required to allay the pain. Calcium chloride, adrenin, and fresh blood-serum are chiefly indicated at the present time in order to act upon the cause of the purpura, which, to all appearance, is of the same nature as that of the crises. (*La Quinzaine thérapeutique.*)

TREATMENT OF MÉNIÈRE'S DISEASE BY LUMBAR PUNCTURE.

At one of his *conférences cliniques* at the Hôpital de la Pitié, Babinski showed a woman, 35 years of age, who five years before had frequently been subject to attacks of vertigo, vomiting, and the other symptoms characterising Ménière's disease. The right ear was almost quite deaf, and showed the usual lesions on examination. Charcot's treatment of this disease with quinine is long and troublesome, and Babinski determined to put into effect an idea which he had formed some time before, and to try the effect of lumbar puncture. The patient shown was the first so treated, and two punctures relieved her of the attacks of giddiness and even of the singing in the ears. Since then about 60 cases of this disease have been treated in the same way, and, in the great majority, a marked improvement has resulted, in some a nearly complete cure. In the case of the patient shown, the attacks of vertigo had occurred three times a week for eighteen months. At the first puncture, 15 c.c. of cerebro-spinal fluid were withdrawn. She was at first very unwell, as is usually the case, but after eight days the improvement was very marked. The second puncture was performed a fortnight after the first, and since then the improvement has remained permanent with complete disappearance of the vertigo, and of the dulled hearing on the left side. Among other cases quoted, Babinski mentioned as the most remarkable that of a priest, who had suffered for 38 years, and had been unable to go out alone for eighteen months. Two punctures had cured him completely, and the cure had already lasted for four years. The therapeutic action is very hard to explain. It can scarcely be set down to the diminished pressure of the cerebro-spinal fluid, because that is re-established very quickly after puncture. It is possible, however, that the puncture produces a sort of concussion or shock, which promotes recovery. Whatever the explanation may be, Babinski is satisfied as to the good effect. He considers that lumbar puncture is free from danger, and has never seen any serious consequences occur in some thousands of cases. It appears only to be dangerous in patients suffering from cerebral tumours, but, apart from this, is harmless, if made with all due and proper precautions. For the intractable affection under discussion, it is a valuable therapeutic measure. (*Journal de Médecine et de Chirurgie pratiques.*)

TWO SYMPTOMS IN HEMIPLEGIA.

Babinski often insists upon the importance, in diagnosing hemiplegia, of two symptoms, which he has described as the platysma symptom, and that of combined flexion of the thigh and the trunk. These symptoms, on the one part, allow of bringing into evidence a slight hemiplegia, and, on the other, help to distinguish an organic hemiplegia from a hysterical.

The platysma symptom is shown when, as in certain actions, that muscle is called into play. The contraction on the healthy side is more energetic than that on the affected side. It is to be noticed in particular when the patient opens his mouth to its full extent, when he flexes his head and resists any attempt at forcible extension, and when he whistles, blows, or goes through the movements of deglutition. The symptom is easily provoked, and in a case of slight facial hemiplegia readily distinguishes the healthy side. Combined flexion of the thigh and trunk consists of the following phenomenon:—When the patient lies fully extended on his back on a horizontal surface, such as the floor, with his arms crossed upon the chest, and then makes an effort to assume the sitting position; on the paralysed side, the thigh makes a movement of flexion upon the pelvis, and the heel is lifted from the ground, while, upon the opposite side, the limb remains unmoved, or the flexion and raising of the heel only take place much more slowly and to a much less degree than on the paralysed side. At the same time, the shoulder on the sound side is carried forwards. The movement is reproduced, and may be more or less accentuated than in the preceding, when the patient, from the sitting position, still with his arms crossed before him, allows the trunk to fall back to the first position. These two symptoms, which are easy to ascertain in organic hemiplegia, are, on the other hand, absent in hysterical hemiplegia. —(*Journal de Médecine et de Chirurgie pratiques.*)

ARSENIC IN ANÆMIA.

Professor Lemoine writes in the *Nord Médical* on the treatment of anæmia, from which article the *Journal de Méd. et de Chir. prat.* extracts the following points bearing upon the administration of arsenic in that affection.

Arseniate of potash, better known as "Fowler's Solution," contains 1 c.g. of arsenious acid to the gramme. (1 per cent. = 0·547 gr. in 1 drachm). Five to twenty drops in the 24 hours is the maximum dose, and a good prescription is—

℞	Liq. Arsenicalis	♏v-xx.
	Tinct. Opii	♏x.
	Mist. Mucilaginosæ	℥iv.

Misce. Fiat Mistura.

To be taken in four doses during the day.

Cacodylate of Soda contains 41 per cent. of arsenic. It is given in cachets, or in a mixture, for which Lemanski recommends:—

℞	Sod. Cacodylatis	gr. $\frac{1}{6}$.
	Pulv. Cinchonæ Sod. Bicarb.	āā gr. vijss.

Misce. Fiat pulvis.

To be taken in a cachet at meals three or four times a day.

Danlos prefers:—

℞	Sod. Cacodylatis	gr. xxx.
	Spirit. Menth. Pip.	♏v.
	"Rum" Syrupi Simpl.	āā ℥ss.
	Aq. ad	℥ij.

Misce. Fiat Mistura.

Take one teaspoonful at each meal.

Arrhenal contains 25·68 per cent. of arsenic, and allows the institution of a regular and intensive treatment without toxic symptoms. Prof. Gautier recommends the strict surveillance of its use in the case of patients in whom the hepatic functions are deficient. He advises that the drug should be given for five days, followed by an interval of the same length of time, and then to begin over again. Lemoine makes use of a 2-per-cent. solution of Arrhenal in water, giving 10 to 20 drops of this at each meal. As arsenic cannot always be taken by the mouth, owing to gastric intolerance, or gastro-intestinal disturbances, which debar any risk of being increased by the irritant effect of arsenic, it is necessary to resort to hypodermic administration. For this purpose the following solutions may be used:—

℞	Arrhenal.	gr. lxxv.
	Acid. Carbolic.	♏j.
	Sp. Vini Rect.	♏ix.
	Aq. destill. ad	℥iijss.

To be sterilised by boiling.

20 minims of this solution contain 1 gr. of Arrhenal.

Sod. Cacodylatis	gr. xcvj.
Acid. Carbol.	♏j.
Sp. Vini Rect.	♏ix.
Aq. destill. ad	℥iijss.

To be sterilised by boiling.

20 minims of this solution contain 1 gr. of Cacodylic Acid.

A daily injection of either of these should be given. The dose may be doubled after resting for a week.

Fowler's Solution in doses of ♏iii. to ♏xv. may be used in progressive doses.

Gilbert and Lereboullet recommend the use of Cacodylate of Iron for hypodermic use, beginning with a dose of $\frac{1}{4}$-grain once a day, and increasing to three times a day.

Reviews of Books.

Lessons in Disinfection and Sterilisation. An elementary course of Bacteriology, together with a scheme of practical experiments illustrating the subject-matter. By F. W. ANDREWES, M.A., M.D., F.R.C.P., D.P.H.; Lecturer on Pathology; Pathologist and Sanitary Officer to St. Bartholomew's Hospital, London. Second edition. Pp. 222. 31 illustrations. London: J. & A. Churchill.

ONLY slight changes have been necessary to bring this work up to date. As Dr. Klein said of it on its first appearance, it offers "in a small compass and in simple and concise description all that is known and worth knowing of the why and wherefore of Disinfection." We can thoroughly endorse this opinion. Dr. Andrewes has every reason to be proud of his most useful work, and the fact that a second edition has been so soon called for is the best tribute to its worth.

The Bacteriological Examination of Water Supplies. By W. G. SAVAGE, B.Sc., M.D., D.P.H. Pp. xvi + 297. London: H. K. Lewis. 6s. 6d. net.

THIS little work is more or less a collection of abstracts from papers on the bacteriology of water, which have been published in the last decade, and to which are added observations by the author on some of the subjects discussed. It may be regarded as representing the position of the bacteriological examination of water from the point of view of the bacteriologist. The B. coli is considered to be the most important indication of sewage pollution; next come the Streptococci, and B. enteritidis sporogenes. Bacteriology and chemistry alike have no difficulty in determining pronounced sewage pollution. It is the marginal case that gives trouble. The author is of opinion that, in such cases, bacteriology supplies the more delicate test. This may be so in certain cases. In others it may not be so. Chemical findings may not be so delicate in certain instances: they are, however, when positive, always to be relied upon, and, even in the hands of different workers, are extremely constant. The question, which naturally arises here, is: Is it possible, at all times, to determine whether a given bacillus in a water is B. coli of fæcal origin? At present, the reply is, No! When this is universally possible, it will be at once admitted that bacteriology is the better guide. Until then, it might be as well to leave the relative merits of the two sciences an open question.

Rational and Effective Treatment of Hip-Disease. By P. BRUCE BENNIE, M.A., M.D., and ALEX B. BENNIE, M.A., M.B. London: Baillière, Tindall & Cox. 5s. net.

THIS brochure is founded on the experience of twenty-eight years' hospital practice in Melbourne. It deals only with tuberculous disease of the hip-joint, and the author believes that "the principles laid down by the late H. O. Thomas, in his work on hip, knee, and ankle, have not been generally known to medical men throughout the world," and that "the methods of Thomas are the only satisfactory methods for treatment of diseases of the hip-joint." He accordingly demonstrates these methods, as well as improvements by himself, including mathematical formulæ for accurate fitting of splint and correction of deformity. Surgeons may learn much from an attentive perusal of this little book, and the practitioner will receive instruction in the simplest methods of measuring for the splint, and for making, fitting, and otherwise adapting the splint for the purposes intended. The book is well illustrated with diagrams, photographs, and skiagraphs.

Pelvic Inflammations in the Female. By THOMAS WILSON, M.D., F.R.C.S., Obstetric Officer to the General Hospital, Birmingham. Bristol: John Wright & Co. 3s. 6d. net.

THIS little book is a reprint of the Ingleby Lectures, which were delivered by Dr. Wilson at the University of Birmingham. The author has thoroughly succeeded in his endeavour to present, in the light of present knowledge, a succinct and coherent account of pelvic inflammations in the female as they are met with in practice. We welcome such an account, seeing the great difficulty which the student experiences in grasping the essential unity of the various affections grouped together under this heading, since, in gynæcological text-books, it is usual to find this subject scattered here and there throughout the volumes, by reason of the anatomical classification of disease therein adopted. The subject is considered in all its aspects, and the importance of bacteriological examination is more fully realised than in any other account with which we are acquainted.

Metabolism and Practical Medicine. By CARL VON NOORDEN, Professor of the First University Clinic, Vienna. English edition under the editorship of I. WALKER HALL, Professor of Pathology, University College, Bristol. Volume III., *The Pathology of Metabolism*, by CARL v. NOORDEN, H. SALOMON, H. STEINITZ, C. DAPPER, M. MATTHES, C. NEUBERG, O. LOEWI, and L. MOHR. London: William Heinemann.

WE are pleased to see the third volume of this work, and to note that its appearance is almost simultaneous with the German edition. This is a precedent which we hope will be followed by other translators whenever possible. There is an up-to-date feeling about the work, which would be impossible, if the translation had been deferred until the German edition had been published.

This third volume is, of course, on the same lines as those which we have already reviewed; it is throughout a history of the facts established about the points under discussion. There is no room for theory, although, in many cases, one feels that one would like to see, at the end of the articles, a critical summary prepared by the author. There is indeed one short article of this nature under the heading "Theory of Gout."

The subjects treated of in the present volume, are:—Diabetes mellitus, gout, obesity, rarer derangements of carbohydrate metabolism, cancer, children's diseases, mineral waters, baths, ductless glands, rarer disorders of protein metabolism, oxaluria, phosphaturia, drugs and poisons, light, nervous and mental diseases, bone and joint diseases, and diabetes insipidus. The article on cancer is rather disappointing, and we are glad to see that Dr. Cramer has added two or three pages on experimental cancer research.

Those of us, who have to keep up-to-date in our work, will find a copy of these three volumes of Von Noorden's work indispensable as a work of reference.

Elements of Physics. For Medical Students. By F. J. M. PAGE, B.Sc., F.I.C., Lecturer on Physics and Chemistry to the London Hospital Medical College. London: Cassell & Co. 5s.

THIS book is the latest addition to Cassell's well-known series of manuals for students and practitioners of medicine, which contains so many old favourites. Mr. Page's book is a welcome addition to the series, and, although expressly written for students going up for the examinations of the Conjoint Board and the Society of Apothecaries, it also brings into prominence those branches of physics which are useful to the student in his future career. Hence the student or practitioner, who wishes to measure his knowledge of the principles of physics, with special reference to their bearing on physiology and medicine, cannot do better than refer to this little work. Such a volume has long been needed.

The Opsonic Method of Treatment. By R. W. ALLEN, M.B., B.S., Pathologist to the Royal Eye Hospital; late Gull Student of Pathology, Guy's Hospital, London. Pp. 138. London: H. K. Lewis. 5s. net.

As the opsonic method of treatment has now come so much to the fore, Dr. R. W. Allen is to be congratulated upon having written such a concise and excellent little book on such an important subject. The book is essentially a practical one, dealing with the determination of the opsonic index both in health and disease, with a brief discussion upon its diagnostic and prognostic value. There is an excellent chapter upon the preparation of vaccines. The portion of the book dealing with "Opsonins: What they are, their Nature and Source," is exceedingly interesting. The book should be carefully studied by all general practitioners, so that they may appreciate this rational method of treatment.

The Technique of Vagino-Peritoneal Operations. By E. WERTHEIM and H. MICHOLITSCH. Translated by C. LOCKYER, M.D., F.R.C.S., Consulting Gynæcologist, St. Mary's Hospital for Women and Children. 138 illustrations. London: Macmillan & Co. 25s. net.

NOTWITHSTANDING the great progress which has been made in this branch of surgery within the last decade, this is the first systematic work which deals exclusively with vagino-peritoneal operations. It is an atlas, rather than a text-book, for it consists of 138 plates, prepared from actual photographs, with a very brief running commentary thereon. In these plates all the details of each vagino-peritoneal operation are displayed step by step. In order to display the various structures exposed during these operations, the pubic symphysis has been divided, and this rather tends to give an impression of shallowness, and easy access to these structures, which is far from being a correct one. Without the adoption of this ingenious device, however, the photographic method would have been impossible, and these excellent plates would have never seen the light.

The methods of opening the abdomen by the vaginal route, viz., anterior and posterior vaginal cœliotomy, are first figured and described; the advantages of the former being insisted upon. Then follows a section dealing with vaginal operations, in which the uterus is retained, viz.:—Vaginal shortening of the round ligaments, vaginal fixation of the uterus, intra-vaginal fixation of the uterus, shortening of the utero-sacral ligaments, vaginal myomectomy, with and without *morcellement*, and vaginal ovariotomy. Extirpation of the uterus, both from above downwards, and from below upwards, is then similarly dealt with, and this is followed by a section devoted to the extirpation of the uterus, together with the adnexa. A brief consideration of hæmostasis, drainage, and accidental injuries, in relation to vagino-peritoneal operations, concludes the volume.

It will thus be seen that it is a valuable and unique production, and we owe a debt of gratitude to Dr. Lockyer for making it accessible to English readers, in a translation which is beyond criticism.

Confessio Medici. By the Writer of *The Young People.* Pp. 158. London: Macmillan & Co., Ltd.

THE author of this exceedingly racy and interesting volume tells us that he stole the title from Gower and Sir Thomas Browne, but it cannot be said that the subject-matter follows either the *Confessio Amantis,* or the *Religio Medici.* The "confession" is modestly explained to be a setting forth of "what I have learned, so far as I have come, from my life, so far as it has gone." To say that it is pleasant reading would be to very inadequately describe the book. It is witty, racy and eminently suggestive, and indeed so attractively written that one is loth to put it down unfinished. The opening chapters on "Vocation" and "Hospital Life" very pithily and judiciously set forth the beneficial character and weighty responsibilities of the Profession; while those which follow are specially addressed, more or less, to present-day Students, but will, we think, be read with intense interest by Students of an older growth. It is, of course, impossible to give an adequate idea of the "Essay for Students" on Psychology in a short review, we can only can say: Read it and enjoy it. We cannot, however, forbear quoting a delicious little passage from the chapter on "Practice":—

"But if money were all that we made by practice, we are far from our deserts. Many of us, gentlemen by birth, experts by education, earn little, even with hard work; and might covet the takings of the public-house, which provides such a multitude of patients for the Hospital, without subscribing to its funds. I wish the present Government would arrange for 10 *per cent.* of the profits of the public-house to go direct to the Hospital, as a slight return for repairs executed on customers."

Again, in "The Discipline of Practice," in dealing with the misfortunes that will happen to the best of us, the author says:—

"Our successful cases, we feel, might belong to anybody; but our unsuccessful cases belong to us. It is true our leaders achieve successes which belong to them alone; but, to us, of the rank and file, the argument seems not merely sentimental, but logical, that, where I succeed, the rest of us would have succeeded; but, where I fail, it is I who fail, and not the rest of us."

These passages will no doubt whet the appetite of the would-be-reader for a fuller acquaintance with the book, and if another word in that direction may be added, it is: Do not omit the chapter on "Retirement," it is full of interest and pathos.

Wintering in Rome. By A. G. WELSFORD, M.D., F.R.C.S., D.P.H. With an Introduction by G. SANDISON BROCK, M.D., C.M., F.R.S.E., Physician to the British Embassy at Rome. London: The Health Resorts Bureau. 2s. 6d.

THIS is the second edition, revised and amplified, of a little book previously published in Rome with the title of *Rome as a Winter Resort*. As Dr. Sandison Brock states in his introduction:—"In a concise, but pleasantly readable form, will here be found all the information required to give them (*i.e.*, those meditating a visit to the Eternal City) a clear and accurate idea of the climatic and the sanitary conditions prevailing in Rome, of the social advantages, occupations, and amusements which it offers, and, if the quest of health be the object of the visitor, some useful indications as to the principal ailments, in which its sunny Italian skies and favourable local conditions may be expected to prove beneficial." The aims and objects of the book are here well expressed, and it certainly fills a lacuna in literature. Current ideas on the subject of Rome from a health point of view are ridiculously antiquated. Although in the past Rome was undoubtedly in a very insanitary condition, and a hotbed of typhoid and malaria, matters have been greatly changed in recent years, and the city now ranks as one of the most salubrious capitals of Europe, having a lower death-rate from typhoid than many English towns. As regards malaria, or so-called "Roman fever," there is nothing now left of it to associate with the city of Rome except the name, "for," as Dr. Welsford states, "malaria does not exist, at the present time, in the city of Rome as an endemic disease." Every medical practitioner should read this charming little book. He would do so with pleasure and profit to himself, and with advantage to those of his patients whom he may recommend to winter in Rome.

Proceedings of the Royal Society of Medicine. Vol. I. Nos. 1 & 2. London: Longmans, Green & Co. 7s. 6d. each volume.

THESE proceedings are edited by John Nachbar, M.A., M.D., acting under the direction of the Editorial Committee.

The first volume commences with an interesting Presidential Address by Sir Thomas Barlow to the Clinical Section of the Royal Society of Medicine, and this is followed by an account of the cases shown. In each of the other sections, namely, Dermatological, Electro-therapeutical, Epidemiological, Medical, Neurological, Obstetrical and Gynæcological, Odontological, Pathological, Surgical, Therapeutical and Pharmacological, there is a detailed account of the papers read and of the discussions which followed. In most of the sections there is a short presidential address. Of the papers, that on 'Pneumonia and its Complications," commenced by Dr. Hector Mackenzie in vol. 1, and continued in vol. 2, is extremely valuable. The second volume contains a detailed account of the paper and the subsequent discussions. Of the more interesting papers, we call particular attention to Dr. G.

Harrison Orton's on the X-ray diagnosis of Renal and Ureteral Calculi, which is extremely well illustrated; to Dr. Meyer Copland's paper, dealing with Medical Inspection in Schools; to Dr. Alfred E. Russell's admired paper on the Pathology of Epilepsy, and, lastly, to the valuable paper, "A Contribution to the Study of the Relationship between Avian and Human Tuberculosis," by Drs. Shattock, Seligmann, Dudgeon, and Panton. The two volumes are exceedingly well got up, and all the illustrations are beautifully reproduced.

Transactions of the Twenty-ninth Annual Meeting of the American Laryngological Association. New York.

No laryngologist's library is complete without this valuable volume, which contains the best work by the best men in America, and which shows how much original research is being done in this department. Most valuable articles are contributed on the use of ligature of the external carotid artery; on the construction of the ethmoid labyrinth; and systemic infection through the tonsillar ring. A most interesting article on modern procedures, in cases of intrinsic cancer of the larynx, is contributed by the veteran J. Solis-Cohen; and Professor Killian (who was a visitor at the last meeting) describes a demonstration of new instruments for bronchoscopy and œsophagoscopy.

Our only regret is our annual plaint—there is no index.

Physical Methods in the Treatment of Heart Disease. By ARTHUR G. DAMPIER-BENNETT, M.R.C.S., L.R.C.P., Visiting Physician to the Royal Marine Hotel and Medical Baths, Kingstown. Pp. 111. Bristol: J. Wright & Co. 3s. 6d. net.

IN this useful little book are discussed the Nauheim methods, and the treatment of cardiac disease by various physical means, such as exercises, massage, etc. As the author says, myocardiac deficiency is the chief indication for the Nauheim treatment, but we think that it is only in very specially selected instances that it is suitable for cases of aortic disease. How the beneficial action of the baths is to be explained is uncertain, but the matter is frankly and ably discussed by the writer. We can sympathise with Dr. Dampier-Bennett when he is puzzled by recommendations for special baths at some Spas. The matter is partly to be explained by the existence of certain kinds of baths only at these Spas, and we are afraid that there is often a tendency to put a patient through the routine whatever his ailment may be.

The case of eczema alternating with gastric (or duodenal) inflammation (mentioned on page 29), is interesting, as some connection between skin ailments and the duodenum is well established. On page 71, we do not quite agree that uric acid is the cause of high arterial tension; it is more usual now to regard this body as only a by-product of deeper changes.

The article on Food is good, and it is an instructive part of the work. By the way, the coagulation of muscle protein begins at 117 F., and it is hardly fair to take the coagulating point of serum albumin to represent muscle, but this is a small point.

The remarks on milk diet are very useful; we are so apt to forget that milk contains such a large proportion of water, and that it may be, for this reason, contra-indicated in cases in which the supply of water should be limited. On page 86, the indigestibility of eggs is often considered to be due to the lecithin of the yolk. It would be interesting to know what are the changes, during cooking, which make the differences between cooked and raw eggs.

We can recommend this book to those who wish to make themselves conversant with the present day physical treatment of cardiac disease.

The Operations of General Practice. By Edred M. Corner, M.A., M.C., B.Sc., F.R.C.S., Surgeon in Charge of Out-Patients at St. Thomas's Hospital, and to the Children's Hospital, Great Ormond Street, and H. Irving Pinches, M.A., M.B., B.C., Clinical Assistant to the Children's Hospital, Great Ormond Street. London: Oxford Medical Publications. 15s. net.

The text-books of minor surgery appear to consider the description of operative details, even of minor operations, outside their province, and the text-books on operative surgery seem to consider the description of these operations beneath their dignity; for, even if they mention them, they do not describe them with that attention to detail which is essential before they can be accepted as a guide to their performance. Messrs. Corner and Pinches have filled a gap in surgical literature, and they have done it well. They have given a wealth of necessary detail to their descriptions of many of the minor operations of surgery, medicine, gynæcology, ophthalmology, otology, which many general practitioners now elect to perform, and many more will do so, we are sure, when they become acquainted with this safe guide. Further, it is a matter of convenience, nay, an absolute necessity, for the busy general practitioner to find all the minor operations he may wish to perform aggregated into one book. No general practitioner can afford to be without a copy of this work.

Diseases of the Ear. By Hunter Tod, M.A., M.B., B.C., F.R.C.S. Pp. 317. London: Oxford Medical Publications. 5s. net.

Divided into fifteen chapters, this work well fulfils the aim, set forth in the preface, of giving a short and practical account of the diseases of the ear Anatomy is not dealt with in a separate section, but that of the external, middle, and internal ears receives attention at the commencement of the chapters dealing with diseases incidental to them. The book is characterised by clearness and conciseness. Points of differential diagnosis are advantageously dwelt upon, and the frequent addition of "points to be observed" is specially to be commended. The work is somewhat dogmatic in tone, but this is not, in our opinion, a fault in a book adapted for students.

The chapter dealing with diseases of the middle ear is good, and we are especially glad to find that the non-suppurative conditions affecting that cavity are dealt with simply, and without the confusion so often met with in text-books. The same may be said of the chapters dealing with middle-ear suppuration and its complications. Indeed, the only chapter in the book which strikes us as somewhat inadequate is that upon diseases of the internal ear.

We read, with special interest, the remarks upon tuning-fork tests, which are, however, a little disappointing. Rinné's test hardly receives the amount of attention to which its importance entitles it. Nor can we quite agree with the author in his opinion of the utility of Gellé's test. The pictorial scheme upon page 71 is ingenious, but of no great value.

Save for these reservations, and in one or two minor points, we have nothing but praise to give Mr. Hunter Tod for the useful little book that he has produced.

Diseases of the Nose. By ERNEST B. WAGGETT, M.A., M.B., M.C. Pp. 282. London: Oxford Medical Publications. 5s. net.

THE author says in the preface "these pages are intended to be read, as they were written, rapidly from cover to cover."

It is a "refreshing" book, for it revives the reader's knowledge of this special branch of surgery so easily that he may both run and read, while further refreshment is derived from the clear clean narrative of a skilful teacher thoroughly versed in his subject. The introduction to the anatomy of the nasal passages and accessory sinuses is sound and lucid, the application of the embryology of this region to the daily work is almost fascinating, while the clinical pen pictures are drawn with telling accuracy. As the reader closes the book, he feels that diseases of the nose have lost their mystery, and that his resources have been greatly fortified.

Rotunda Midwifery for Nurses and Midwives. By G. T. WRENCH, M.D., late Assistant Master Rotunda Hospital. London: Oxford Medical Publications. 6s. net.

THIS book, which is provided with an introduction by Dr. Hastings Tweedy, the Master of the Rotunda Hospital, will be of value to those who are interested in the teaching of midwifery to nurses and midwives. It has been written with the view of meeting the requirements of candidates proceeding to the examinations of the Central Midwives Board, whose rules and regulations have been reproduced in the Appendix. Written in a simple style, the book is singularly free from technicalities, so that even a beginner should find little difficulty in acquiring a sound theoretical knowledge of her work from it.

A Laboratory Handbook of Bacteriology. By RUDOLPH ABEL. Translated from the Tenth German Edition by M. H. Gordon, M.A., M.D. With additions by Dr. A. C. Houston, Dr. T. J. Horder, and the Translator. London: Oxford Medical Publications. 5s. net.

THIS little book has met with great success in Germany, where a new edition has appeared almost annually since 1898. The translation has been skilfully rendered, and the English edition has been improved by the incorporation of new material on the examination of water, milk, and sewage from the pen of Dr. A. C. Houston, and, on the methods of removing material from the body for bacteriological examination, by Dr. Horder, whilst Dr. Gordon has added a section on methods of examining the blood in relation to immunity, and has considerably amplified the section on dust and air.

The volume forms an excellent handbook for use at the bench in the bacteriological laboratory, and we believe that, in its English dress, it will also command much success.

Practical Anæsthetics. By H. Edmund G. Boyle, M.R.C.S., L.R.C.P.; Assistant Anæsthetist to St. Bartholomew's Hospital; Demonstrator of Anæsthetics to the Medical School of St. Bartholomew's Hospital, &c. Pp. 178. 11 plates and 11 figures. London: Oxford Medical Publications.

The author has endeavoured to treat the administration of anæsthetics from a practical point of view alone, and to furnish a short guide to those who have not leisure to study the larger works on the subject. We can congratulate Mr. Boyle on the successful accomplishment of his purpose, for his book teems with practical advice, which is manifestly the outcome of experience in the use of the different anæsthetics ordinarily employed. We must confess to feeling surprised that Mr. Boyle should advocate the so-called "open method" of giving chloroform, although of course it is still the method preferred in the great school to which he is attached. We certainly thought that it was generally acknowledged, nowadays, that the great drawback to this method is the fact that the percentage of chloroform-vapour inhaled varies so much and so quickly—from 10 to 0 per cent.—which is itself a source of danger by no means to be overlooked. It is this danger, which the Vernon Harcourt inhaler specially overcomes, and we believe that, next to this invaluable invention for safety, comes the improved Junker with a face-piece fitted for a covering of lint or flannel. Carefully and properly used, the percentage of vapour cannot be raised too high, and can be kept fairly regular.

Rotunda Practical Midwifery. By E. H. Tweedy, M.D., F.R.C.P.I., Master of the Rotunda Hospital, and G. T. Wrench, M.D., late Assistant Master. London: Oxford Medical Publications. 16s.

As its name implies, this is essentially a practical treatise on midwifery based on the teachings of the Rotunda hospital. As the authors admit, "it does not pretend to compete with the very many excellent treatises on midwifery, but, omitting all that is theoretical and not immediately useful to the practitioner, it aims at affording him a concise guide to the elucidation of the many difficulties."

The conditions described are those likely to arise in practice, and they have been described in simple language from the standpoint of the practitioner who has to largely rely on his own resources. The book is well illustrated, with illustrations drawn, without exception, from original sources.

The most combated view of the Rotunda school deals with the question of plugging the vagina in cases of accidental hæmorrhage. The authors strenuously uphold its value, and give, at length, precise directions regarding its mode of application. They consider that it checks hæmorrhage by kinking and pressing on the uterine artery—a view which they admit is stoutly denied by most authorities.

The book is an interesting one for the practitioner; for the student, however, the absence of Pathology, and the scanty treatment devoted to the important subject of mechanism, make it a very incomplete instructor

Notes by the Way.

The Opening of the Medical Sessions.

ONCE more we have reached the month in which the medical year begins, and in which freshmen commence, and their seniors resume, their studies at the medical schools. It is a moment which, in the older universities devoted mainly to the "arts," arrives, and is allowed to pass, without special recognition by any striking form or ceremony. Nobody is called upon for a speech; everybody drops, more or less quietly, into his place. Nor is there any particular reason why it should be otherwise; for the interests alike of undergraduates and professors are diverse, and the feeling of "*esprit de corps*," which unites them, is by no means due to any habit of labouring together for the advancement of some branch of learning esteemed equally important by all of them. It is only a minority among them, who will continue, or make any practical use of, their studies, after graduation. Consequently, there really is nothing for anyone to make a speech about. On the other hand, the contrasting tradition and practice of the medical schools and hospitals is a natural and appropriate reflection of a different order of things. The studies there pursued stand in direct and obvious relation to life. The student there who does not study has no *raison d'être*, and indifference to the results of the researches of the teachers is practically an unknown thing. Whereas there are many Oxford and Cambridge undergraduates, whom the discovery of a lost book by Aristotle or Tacitus would leave cold it is impossible for medical students to adopt that callous tone towards X-rays and anti-toxins. They are interested in such things in the same spirit in which they are interested in their private affairs. Hence the importance of the annual addresses with which the Medical Sessions are inaugurated, and the accompanying convivialities, so valuable for the interchange of experience and the renewal of old friendships between men who have "blushed unseen" and others who, it may be without blushing, have become conspicuous.

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The Advantages of the Modern Student.

PRIMARILY, of course, the occasion is one for the welcoming of new students; and with the welcome there may well be mingled congratulations on the educational advantages which they are about to enjoy—advantages which were denied to the medical students of an earlier period. Few of them, we imagine, realise under what grave disabilities their forefathers studied medicine, beginning, as did many of the greatest of them, as apprentices to general practitioners. They will find many surprising details on that branch of the subject in the medical biographies that have recently been appearing in our columns; and they should look them up, if only for the purpose of appreciating the superiority of their own fortune over that of many men now in harness. University extension has made it easier for them to study the necessary science, whether in London or in the provinces. Hospital teaching is far better than it used to be, and there are more specialists among the teachers. Decidedly it is fitting to address the freshmen of to-day in the language in which they will presently write prescriptions, and exclaim: *O fortunatos nimium sua si bona norint!*

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The Feeble-Minded.

THE Royal Commission on the Care and Control of the Feeble-minded has presented a voluminous Report, to be followed shortly by six volumes of evidence and appendices. It is estimated that there are 149,628 feeble-minded persons in England and Wales, in addition to our 121,979 certified lunatics; but an estimate, of course, is not a census. The figures were only got at by making inquiries in sixteen districts presumed to be typical, and inferring from the totals for these districts the grand total for the United Kingdom; and, as feeble-mindedness is, after all, a relative term, the utmost rigidity of definition cannot be depended upon to secure the application of uniform standards by all the various enumerators. Indeed, some of the definitions formulated seem actually to invite variety of interpretation. The class of those, for instance, "incapable from mental defect . . . of managing themselves and their affairs with ordinary prudence," might easily be large or small according to the conception of prudence entertained by the individual statistician. For the same reason, too, it is impossible to be sure that the number of the mentally defective is, as it is said to be, increasing. No trustworthy statistics relating to past conditions are available, and the standards applied in the past are a matter of conjecture. The fact remains, however, that the figures relating to the present, in so far as they have been ascertained, are formidable, and that the vast army of feeble-minded persons who are at large, may be a source of danger to the community in two ways. They are the irresponsible authors of many trivial offences against property, and, occasionally, of atrocious crimes; and they are liable to bear, or beget, children, to the perpetuation of the evil, and to the degeneration of the race.

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The Proposal of the Royal Commission.

THE last-named contingency presents at once the more difficult and the more important problem. If the multiplication of the feeble-minded can be checked, the question of taking care of them will lose a great deal of its urgency. There are those who think that the case is one for the surgeon, and that we should adopt the measure commonly known as the "sterilisation of the unfit." There were a few witnesses who urged that course upon the Commission; but the Commissioners decline to endorse it—most wisely, in our opinion. The plan would place far too heavy a responsibility upon the shoulders of those who had to decide whether it should be followed in any given doubtful case; and it certainly would not be tolerated by a public sentiment which was outraged even by the Contagious Diseases Act. It remains, therefore, to sterilise the feeble-minded by means of segregation; and that is the essence of the Royal Commissioners' proposal. The mentally defective, they consider, should be certified, protected, and kept under control —not, of course, in lunatic asylums, but in suitable homes, institutions, or colonies, or under the guardianship of selected families.

* * * * *

What can be done?

SOMETHING of the sort probably will be, and certainly ought to be, arranged. It is the duty of society to protect those of its members who cannot protect themselves, and it is also to its interest to do so. Whether it is sufficiently organised to be able to do so quite as effectively, and with quite such satisfactory results, as the enthusiasts expect, is, of course, another question. It is likely enough that there will, for reasons of economy, be laxity of administration in districts in which the burden of the rates is already oppressive. There is also a strong probability that any law that may be passed will be extensively evaded—that many of the feeble-minded will, in practice, slip through the meshes of the net, and that those, whom it is most important to detain and control, will also be those on whom it will be most difficult to lay hands. Moreover, those of them who are detained, unless they are kept under the same close observation as prisoners or lunatics, will almost certainly escape from time to time. All these are difficulties which it is reasonable to anticipate. But the step which is recommended will none the less be a step in the right direction, and the net result of taking it can scarcely fail to be good, even if it does not fulfil all the hopes of those by whom it is advocated.

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Occupational Mortality.

DR. TATHAM'S letter to the Registrar-General on the comparative mortality of persons engaged in various occupations in England and Wales in the years 1900, 1901, and 1902, bristles with points of interest, only a few of which it is possible for us to note. So far as the professions are concerned, the death-rate appears to be lightest among clergymen and heaviest among doctors; and the reasons for the difference will be obvious to every medical man. The parson has no night-bell, and is not apt to be rung up for a baptism, as the practitioner is apt to be rung up for an accouchement; nor has he any fear that his income will suffer if he coddles himself when he is unwell instead of paying parochial calls. Indeed, even the well-known clerical liability to laryngitis ought to be diminishing in an age in which ten minutes is considered amply long enough for a sermon; and there are no other ailments specially favoured by the circumstances of the sacred calling. Law, in point of mortality, occupies a position midway between physic and divinity. The reason may be that, whereas on the one hand, the London lawyer inhales too much of the unhygienic atmosphere of the courts, the country solicitor is often able to leave his business to his clerks, while he goes fly-fishing or golfing; and so the balance is redressed. Publicans, to pass to another branch of the subject, die with a frequency which must be surprising even to themselves. Their tendency, when they envisage the question, is to attribute their excessive mortality to the dangerous work which they do in the cellar, and the poisonous air which they breathe behind the bar. It is likely enough that these factors are operative, but less likely that they are the only ones.

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Dangerous Trades.

THE relation between mortality and dangerous trades is another matter to which Dr. Tatham naturally gives great attention. The fact that dangerous trades tend to promote reckless living, which is itself a cause of mortality, vitiates the statistics; but useful conclusions can nevertheless be drawn. It is established, at any rate, that the adoption of certain definite precautions produces satisfactory results. This is clearly brought out by the tables showing the results of breathing foul or dust-laden air. The purification of the air has been followed by a diminution of the mortality from phthisis in several occupations. Very curious and interesting too, as showing the relation between cause and effect, are the figures concerning the various industries in which there is an appreciable risk of lead poisoning. The mortality from this cause, we are told, is diminishing among lead-workers, file cutters, potters, and glass-workers, but is not diminishing among plumbers and painters. Why? Because the four industries first mentioned are generally conducted on a large scale under employers who see that the necessary precautions are taken as a matter of routine, whereas the plumber, working under a small employer, is left to take his own precautions, and very seldom takes them. That is Dr. Tatham's explanation, and it is probably the true one.

Practical Notes.

A RUPTURED TUBAL PREGNANCY.—A ruptured Fallopian tube, due to an ectopic gestation, constitutes one of the important surgical emergencies, and calls for immediate treatment by the practitioner. There frequently is a very considerable amount of internal hæmorrhage, and the patient becomes almost immediately collapsed. The questions, which the medical attendant has to decide, are, whether an operation should be performed immediately, or how long should he delay, or whether the patient should be removed to more favourable surroundings, such as a hospital or nursing home. In connection with the question of immediate operation, Dr. C. E. Purslow, of Birmingham, writes as follows: "There are two points, derived from my own experience, which occur to me in respect to this. The first is that removal of the patient often causes further hæmorrhage, and hastens a fatal termination, and that better results are obtained when the operation is performed in the patient's own house, even though the conditions may not be ideal, than when further collapse has been brought on by the removal to a nursing home or hospital, and I have had excellent results when I have operated, even in the middle of the night, in the patient's own room.

"The second point is that, if operation is deferred for a time owing to the intensity of the shock, the patient stands a better chance of rallying, if, in addition to the means usually advised, a tight abdominal binder is applied. It is conceivable that this may directly tend to check hæmorrhage, by increasing the pressure in the abdomen, including that on the bleeding point, but, even if this is not granted, it cannot be denied that it tends to arrest death by driving the blood from the large veins of the abdomen, and by consequently increasing the cerebral circulation.

"In one case, which I recently saw in consultation, the patient was so collapsed, when seen at 10 p.m., that immediate operation would almost certainly have proved fatal; a tight abdominal binder was applied and a dose of morphia given, and, in the morning, the patient had rallied to a surprising extent, and a successful operation was then performed."

EXAMINATION OF PUNCTURE FLUIDS.—Questions arise as to the exact nature of a specimen of fluid removed (especially from the pleura or peritoneum) by puncture or aspiration, and many tests have been proposed for distinguishing between exudates (*i.e.*, fluids of inflammatory origin or due to carcinoma) and transudates, whether they are due to nephritis, or to back pressure, or other mechanical causes. These have been admirably discussed by Gruner in his recent work on puncture fluids,—a most important and interesting survey of the whole subject, and a notable addition to the science of clinical pathology. We quote some of the simpler tests suggested.

The Specific Gravity.—The specific gravity often gives valuable information, as it is lower in transudates than in exudates. As a general rule, 1020 may be considered the indifferent point, and the farther the specific gravity is above or below this point, the more likely is the fluid to be an exudate or transudate respectively. Of course, exceptions occur, but they are unusual, and it may be pointed out that there can be no absolute criterion between the two, since there are numerous cases in which the causes, which lead to both classes of fluids, are at work.

The high specific gravity is, of course, due in the main to the amount of albumen present, and Gruner quotes, with approval, the following table from Reuss :—

Sp. Gr.	Amount of Albumen.
1018	more than 4 per cent.
1015	less than 2·5 „
1012	„ „ 1·5–2 „
1010	„ „ 1·0–1·5 „
1008	„ „ ·5–1·0 „

According to Engländer, the diagnosis of tubercle can be excluded, if the amount of albumen (as determined by weighing) is less than 3 per cent. Carcinomatous exudates show a large amount (up to 7 per cent.). In portal stasis, it is about 2 per cent. or less, and, in hydræmia, much less (·3 to ·5 per cent.).

Rumeberg has suggested a simple test depending on these facts. A few drops of nitric acid are dropped into a column of the fluid. A thick heavy plaque of coagulated albumen, which rapidly sinks, indicates a transudate, probably inflammatory or tuberculous. Abundant large flocculi, sinking less rapidly, indicate a congestive transudate. An opalescence, with small flakes, making their appearance after a long time, indicates a hydræmic transudate.

The Albumen.—The nature of the albumen present is also of importance. In inflammatory fluids, from the peritoneum especially, *serosamucin* is usually met with, whilst it is absent from transudates. The exact nature of this substance is not yet settled, but there is a simple and easy test for its presence. Two drops of glacial acetic acid are mixed with 100 c.c. of distilled water, and a drop of the fluid to be examined is allowed to fall into the mixture. A positive result is indicated by the formation of a white cloud in the tail of the descending drop. This white cloud must increase as the drop descends, and the degree of whiteness indicates the severity of the inflammatory process (Rivalta's test).

The Micro-organism.—The determination of the cause of an inflammatory exudate, *i.e.*, whether it is due to tubercle or to other organisms, is often of importance. The most certain test is, of course, the bacteriological demonstration of the bacillus. This may be carried out by the injection of animals, or more simply by Jousset's process of *inoscopy*. In order to apply this method, allow the fluid to clot, wash thoroughly in water, and digest the coagulum in pepsin and ·2 per cent. HCl, adding a little chloroform or thymol to prevent too copious bacterial growth. When digestion is complete, centrifugalise, spread films, and stain in the usual manner, taking care to avoid over-decolorisation. This method is usually successful if a large quantity of fluid (100 c.c. or more) is available, but may fail with small amounts.

Cytodiagnosis.—The method of cytodiagnosis is quicker, and usually gives satisfactory results, especially in the case of pleural exudates. The distinguishing feature is the presence of lymphocytes; and these cells indicate the reaction of the tissues involved, to the action of an irritant of low activity. In the case of the pleura, this is almost certain to be the toxin of the tubercle bacillus, if the case is an acute one. In more chronic cases, lymphocytes may occur in the course of an ordinary "septic" infection, in which the characteristic cell is the polynuclear leucocyte: there the lymphocytes are of good prognostic omen, indicating that the irritant has become less potent, or that the tissues have become immunised to its action. These cells may also be found in mechanical transudates, especially of long standing, since there are often chronic inflammatory processes at work in the congested serous membranes. The methods of cytodiagnosis are simple in the extreme, and, in most cases, all that is necessary is to mix some of the fluid (or preferably some of the deposit after centrifugalisation) with a drop or two of methylene blue, then apply a cover-glass, and examine after a short interval. If the fluid has already coagulated, it may be shaken up in a bottle with some beads, or fragments of glass, and the fluid treated as above, or sufficient cells may often be obtained by rubbing some of the coagulum on a slide.

Wideroé's Test.—According to Wideroe, some information may be obtained by a simple chemical test, carried out as follows. A few drops of Millon's reagent are placed in a watch-glass, and one drop of the fluid to be tested placed on the surface. A film of coagulated proteid at once forms, and its tenacity is tested by attempting to lift it by means of a platinum loop. This is readily accomplished if the exudate is tuberculous, the film being coherent; less readily, if the exudate is inflammatory, the film breaking much more easily, and quite impossible in the case of transudates. The test is useless if blood is present.

Examination of Pus.—Where pus, devoid of any demonstrable organisms, is found, it may either be tuberculous (for the bacilli are often present in but very scanty numbers, and can only be detected by means of animal experiments) or come from an old abscess due to "septic" bacteria (staphylococci, streptococci, etc.), the organisms of which have been killed off. Here again a cytological examination may give the clue, for, in tuberculous pus, lymphocytes predominate, as a rule. The detection of trypsin, which is apparently set free from the polynuclear leucocytes, is also suggestive. It is not necessary to use any special test for this substance, since cultures, made on blood-serum, will suffice to detect it, the solid medium being eaten away, just as if a liquefying organism were present. The occurrence of this erosion in a culture inoculated with pus from which nothing grows is strong evidence against tubercle. It is not absolutely conclusive, since the abscess may have become the seat of a secondary infection with septic bacteria, and a consequent influx of polynuclear leucocytes.

Carcinoma-Cells.—According to Gruner, it is possible to distinguish between carcinoma-cells in an exudate, and thus diagnose malignant disease of the pleura or peritoneum by an examination of the fluid removed by aspiration. In this he differs from other writers, who consider that the resemblances between malignant and endothelial cells are so close that the diagnosis can only be made, when *masses* of the former are present. He describes the main differences between the two as follows:—(*a*) The endothelial cell has *usually* a very large cell-body with a regular oval nucleus, which stains feebly by Jenner's method. (*b*) The cells are all similar in appearance, whereas, in the case of carcinoma-cells, there are scarcely two alike. (*c*) The nucleus of a malignant cell, in favourable circumstances, stains deeply, and shows mitotic figures, often of heterotype character (an appearance which does not seem to have been observed by any other authority, though often looked for, and it is regrettable that Gruner did not confirm the point by photographs), and frequently contains many nucleoli. (*d*) Many cells adhere together in bud-like fashion. It is to be hoped that these observations may call renewed attention to this question, obviously a most important one, since, in the opinion of some, the appearances described can all (with the exception of the heterotype mitosis) be paralleled in endothelial cells of different ages and states of activity. In many cases, however, a careful and thorough search of the exudate may lead to the discovery of very definite alveoli of cells, which absolutely settles the diagnosis.

STERILISATION OF A TEST-TUBE.—A sterile test-tube is frequently required at short notice for the collection of a specimen of pus, or other fluid for subsequent bacteriological examination. The best method for rapid sterilisation is not boiling, but the direct application of a flame. Proceed as follows:—Plug the tube in the ordinary way with cottonwool, and heat the lower half of the tube in the flame of a Bunsen burner or spirit-lamp until it is so hot that it can only be touched for a moment. Then, holding it in a cloth or piece of paper, heat the upper end in the same way, taking care that the outer layers of the cottonwool plug are scorched. Tubes, treated in this way, are absolutely sterile, except for the inner portions of the plug, whereas a boiled tube may contain the spores of bacilli, many of which resist the temperature of boiling water.

Preparations and Inventions.

A NEW PORTABLE ILLUMINATIVE ATTACHMENT FOR THE OPHTHALMOSCOPE.

(Bristol: Messrs. King & Co.)

Dr. Clements Hailes has devised a small portable electric lamp, which may be readily attached to an ophthalmoscope, thus enabling the ophthalmic surgeon to be independent of other sources of light, such as candles, lamps, etc., when he is away from his consulting room. The apparatus before us consists of an unspillable accumulator contained in a small flat leather case. Electrical connection is made from the battery to the lamp by means of a light flexible cord. The illuminative attachment consists of a metal cylinder, fitted with a convex lens of one inch focus, and, in the bottom end of the cylinder, an "Osram" surgical bulb. The inner surface of the cylinder is lined dead white, and a small milled screw is fitted at the lower end, which acts as a switch for the light. The metal cylinder may be attached to the ophthalmoscope by means of a clip and a jointed arm. The apparatus is a most convenient one, and will be a great boon to those who are frequently examining the fundus oculi, for the patient may be examined with equal ease in the standing, sitting, or recumbent position, the illuminating power remaining constant.

NEW "TABLOID" HYPODERMIC PREPARATIONS.

(London: Messrs. Burroughs Wellcome & Co.)

For a considerable time, the administration of a combination of atropine and strychnine has proved of great service in the treatment of inebriety and narcomania. In connection with chronic alcoholism, after the drugs have been given for a few weeks, the patient has acquired a distaste for alcohol, a distaste which has been known to last for a varying period. Two tubes, each containing 20 tabloids for hypodermic use, have been submitted to us. The one, numbered 121, contains tabloids, each containing atropine sulphate, $\frac{1}{200}$ grain, and strychnine sulphate, $\frac{1}{100}$ grain; the other, numbered 122, contains atropine sulphate, $\frac{1}{60}$ grain, and strychnine sulphate, $\frac{1}{80}$ grain. We consider these new preparations to be of distinct advantage, and, owing to their easy solubility, to present a very convenient and efficient means of carrying out the treatment.

THE PRACTITIONER.

NOVEMBER, 1908.

HOME TREATMENT AND NURSING OF PULMONARY TUBERCULOSIS IN DUBLIN.

BY SIR WILLIAM J. THOMPSON, M.D., F.R.C.P.I.,
Physician-in-Ordinary to the Lord Lieutenant of Ireland; Physician, Jervis Street Hospital; Consulting Physician, National Hospital for Consumption, Ireland.

IN dealing with the important question of the treatment and prevention of Tuberculosis, it is now universally admitted—(i) That the early cases should be, if possible, treated in Sanatoriums, for the reason that the earlier the patients come under treatment the better chance there is of the disease being arrested; also that these patients, when they return home, act as education centres, not only for their own families but also for others. (ii) That advanced cases should be taken care of in homes of rest, or such like institutions, as it is these cases that are most dangerous, and do more to spread the disease than any others.

To find accommodation for all these would be utterly impossible, especially in Ireland, where the death-rate, from this disease, is almost 12,000 per annum. If we take it for granted that there are any number between 5 and 10 suffering from the disease, for each death we get, alone in Ireland, anything from 60,000 to 120,000 affected people. The question then arises, is it not possible to do something, especially for the poor, in their own homes?

It was to try to do something in this direction that prompted Her Excellency the Countess of Aberdeen, President of the Women's National Health Association, to take action in the matter in Dublin. As special Tuberculosis Dispensaries, combined with Home Nursing, had been carried on successfully in New York and other places, Lady Aberdeen communicated with each of the ten Clinical Hospitals in Dublin, asking that one representative from the Medical Staff should be nominated to act on a committee to consider the whole question. All the Hospitals readily responded, and a committee was thus formed (consisting of ten medical men, together with Lady Aberdeen), called the Hospitals' Tuberculosis Committee.

This committee considered the advisability of establishing special Dispensaries for consumptive cases in connection with the hospitals, but finally decided on a plan of voluntary notification, which works out as follows :—A special register is kept at each hospital of all the cases (both extern and intern) of tuberculosis attending there. The question should be put by the medical attendant to the patients, or to their friends, whether they wish a nurse to visit their homes free of charge. If they do, they can get the services of the nurse by posting a stamped and filled up post-card to the central office of the Women's National Health Association. On receipt of this card, the Women's National Health Association will send a nurse to the patient's home, who will give the sufferer all necessary attention. For statistical purposes, and for the general information of the committee, a form of inquiry has been drawn up, to be filled in by the nurse, and returned to the Hon. Secretary. The Women's National Health Association placed at the disposal of the committee two specially trained nurses for the carrying out of home treatment and nursing of tuberculosis patients. This scheme came into working order about the middle of February.

On August 21st, 1908, the Hospitals' Tuberculosis Committee had before them the result of six months' working. During that time, 157 patients were visited in their own homes by the nurses, and 3,075 separate visits paid. In 50 cases the patients requested the nurses to visit them, showing how these people appreciate the services of the nurse.

It is found that—

47 patients, or practically 30 per cent. of all, showed distinct signs of improvement, and that 11, or 7 per cent. of the whole, or 23 per cent. of those improved, were able, during the six months, to resume their ordinary work.

41 patients were, through the aid of the nurse, got into the Sanatoriums, Hospitals, Hospices, and kindred Institutions.

8 families were removed to more healthy homes.

8 cases were attended who had been to Sanatoriums before.
5 cases were sent to the country to convalesce.
3 insanitary houses were reported.
36 rooms were disinfected.
80 sputum flasks were distributed.

Through the assistance of the Samaritan Committee of the Women's National Health Committee, as well as by the help of other philanthropic and charitable organisations, the nurses were able to render substantial aid to several patients.

For instance:—

47 families received nourishment in the way of milk, eggs, meat.
36 families received clothes, shoes, and beds, so that the patient might sleep alone.
19 children of parents suffering from tuberculosis were sent to the country.
4 families' rent were paid while the bread-winners were in Sanatoriums.
3 families of children were boarded out while the mothers were under special treatment.

The nurses found, on their first visit, that quite a large number of cases were advanced, and, as there was no precaution taken against infection, there were usually two and sometimes three members of the one family affected. In such cases the nurses were able to get medical advice for these patients before the disease became well marked. In some patients, the nurses found that the cases could be traced to what might be called direct infection.

From the statistics for six months it is found that the sexes are almost equally affected—but that more men are affected between the ages of 20 and 30 than at any other period; and more women between the ages of 35 and 45. It is also a remarkable fact that, in the case of either parent being affected, or having been affected, quite a large proportion of such families have lost one, and sometimes two children from tubercular meningitis. This is a point not, so far as can be ascertained, mentioned before, and it would be most interesting to find out if the experiences of others coincide with this.

The nurses instruct the patients and their friends as to—

(*a*) The proper method of ventilating the room and house.
(*b*) The best means of making the most of and utilising whatever food is available.
(*c*) The right way of cooking, etc.
(*d*) The absolute necessity of cleanliness, and how easily this can be attained.

A proof that the patients appreciate the ministration of the nurses can be found in the fact that when the nurses were away on holidays, they found on their return that some of their patients had changed their abode, and that in every case the nurse received a special message to the effect that the patient wished the visits to be continued.

The Samaritan Committee contemplate also, as funds increase, the erection of platforms outside patients' windows, with the object of getting them to remain in the open air as long as possible; also movable shelters, which, after being used by one patient and disinfected, can be removed and used by another.

The committee feel satisfied that the present system of voluntary notification and home treatment, nursing, etc., as carried on in Dublin, is now beyond the experimental stage: and that this, when further developed, will be a valuable addition to the ordinary method of treatment.

INFECTIVE OR ULCERATIVE ENDOCARDITIS.

By NESTOR TIRARD, M.D., F.R.C.P.,

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In medical practice, there are few diseases which create greater anxiety than infective or ulcerative endocarditis. When recognised during life, the prognosis is necessarily grave, but unfortunately the mode of onset, and the prominent symptoms often present the utmost variations, and it is frequently almost impossible to avoid forming an erroneous diagnosis. The disease has long been described in text-books, and numerous accounts of isolated cases have appeared in the *Transactions of the Pathological Society* and elsewhere. Every practitioner of experience has had cause to realise that the details of clinical work will not always harmonise with the mental picture he had formed from his reading. It is always instructive to note variations of type, and to endeavour to deduce warnings which may be of service in future work.

Recently, several cases of ulcerative endocarditis have been under my observation, and they have presented such diversity of symptoms that they may be briefly described, compared, and contrasted. The first was a coachman, aged 41, who was admitted to King's College Hospital for what appeared to be a mild attack of subacute rheumatism. From the first, however, he was evidently far more seriously ill than would have been anticipated from the moderate degree of fever, and the slight character of the rheumatic pains. He was sallow and anæmic, with a malar flush; his respirations were rapid and shallow, and there was marked dyspnœa when answering questions. Apart from a history of chronic alcoholism, there had been nothing noteworthy until three months before his admission, when he noticed pain in the left big toe, lasting two days; this was succeeded by pain of short duration in the left knee. A month before admission pain returned in the left knee, and the joint became swollen and very tender. He stated that on two or three occasions he had had profuse sweats. During the time he was in hospital some of the other joints were moderately affected. He complained of discomfort in the wrists, elbows, and knees, but the pain never remained long in any one site. The chief interest centred in the condition of the heart; the area of cardiac dulness was increased from the nipple line, on the left side, to a finger's breadth beyond the right sternal margin. The cardiac impulse was feeble, and, at this point, on admission, the systolic and diastolic sounds were weak, but no murmurs were audible. At the base of the heart, the first sound was present, but the second was replaced by a soft diastolic murmur, which was most clearly heard to the left of the sternum, over the third costo-sternal junction. With moderate doses of sodium salicylate, the temperature soon fell to normal, and the joint trouble ceased. Subsequently, however, the temperature again rose, and no longer responded to salicylates. The cardiac signs meanwhile changed considerably; at one time the aortic diastolic murmur was inaudible, and all sounds were indistinct; at another, a soft mitral systolic murmur became evident, and, for a short time, a double murmur, systolic and diastolic, was heard at the base of the sternum, over such a small area that it suggested the possibility of pericarditis. Examination of the blood by Dr. Emery showed the presence of streptococci, and a vaccine was accordingly prepared. About six weeks after admission, the patient had two attacks of pain in the right side of the chest, and began to expectorate some blood-stained sputum. These attacks were associated with a sharp rise of temperature, and with an increase of dyspnœa; and a patch of dulness, with tubular breathing, was found upon the right side of the chest in the supra-scapular region. A little later, similar pain occurred in the region of the spleen, which became very tender on palpation. The temperature was very irregular, being frequently 100° to 101° with remissions to normal. The pulse was regular, of small volume and low tension, and towards the end, it became very rapid. Two injections of a dead culture prepared from his blood were given, but they were of no avail, the man ultimately dying after being in hospital two months. The post-mortem examination showed the pericardium slightly adherent, and covered with a recent soft deposit of fibrin, which was easily broken down. The heart was dilated, and somewhat hypertrophied, but the colour of the muscular wall was good. The cavities of the right side of the heart were much dilated, but the valves were normal. The aortic valves were a mass of fungus-like vegetations. They were slightly adherent at their edges, but not perforated. Vegetations also extended upwards on to the first part of the aorta. The left ventricle was dilated, and filled with clots, and the mitral valve had several small vegetations along its margins. Signs of recent infarction were found in both lungs, and in the spleen.

The foregoing case has been described in detail, as it is perhaps the most typical of my three cases; it may suffice to give a brief summary of the chief features of the second and third cases.

The second case was that of a girl of 26, who was admitted to the hospital at the same time as the foregoing for acute rheumatism of a fairly severe type. In this case, the sounds of the heart were at first normal, but later double aortic murmurs were heard, and, after a time, they were replaced by a soft mitral murmur. Soon after her admission, she developed the sallow pallor of toxæmia, and this persisted for some five weeks, during which there were frequent wide oscillations of temperature. Following one of these febrile attacks, there was complaint of pain in the left side of the chest, and pleuritic frictions were heard along the left side of the sternum; during the next few days these gradually extended outwards until they reached the anterior axillary line. Her blood was repeatedly examined with negative results, but, in spite of this, the severity of the illness, the toxic appearance, the variability of the cardiac murmurs, and the character of the temperature chart led to the diagnosis of infective endocarditis. This patient, however, ultimately was able to leave the hospital; the lung signs cleared up, the colour of the skin improved, and, but for the presence of a soft mitral murmur, she was fairly convalescent when she left.

My third case was far more obscure throughout its course. The patient was a man, aged 46, who had lived abroad, and had had malaria. The illness commenced suddenly in January, after riding, without an overcoat, on the outside of a motor omnibus. The first symptoms were rigors, with rather severe pains all over the body, and vomiting. The pains were not localised in the joints, and there was no swelling or tenderness. When first seen, the temperature was 103·4°, but during the next two days it fell to 100°. The vomiting was severe and continuous; it occurred almost immediately after swallowing solids or liquids, and was accompanied by retching. The complexion was sallow, the tongue dry and foul, and the breath distinctly offensive. Since all food and medicines were immediately rejected, the patient had to be fed by nutrient enemata. From the first there were no abnormal sounds in the heart or the lungs. Examination of the blood showed at this time no malarial or other organisms. On the fifth day of the illness, there was much pain along the costal margins on both sides, and as there appeared to be some slight tinging of the conjunctivæ, and some tenderness in the region of the gall bladder, it was considered desirable to explore this region, but nothing was found to account for the pain or the vomiting. During the next fortnight, the toxæmic condition increased; the intelligent but apathetic condition of the first few days gave place to increasing drowsiness, and ultimately to coma from which he could not be roused. The temperature showed wide oscillations, on three occasions rising to 104° and once to 105°, falling in a few hours to subnormal; the general range was between 101° and 103°. Profuse perspirations generally accompanied the oscillations of temperature, and towards the end there was frequent offensive diarrhœa. At the post-mortem examination, apart from engorgement of the bases of the lungs, the only abnormality found was in the heart, where the folds of the mitral valve were covered with large dark masses of soft spongy vegetations. The brain was carefully examined, but there were no signs of meningitis, abscess, or tumour.

Comparing the three cases, the most marked features common to all were those connected with the temperature. Even in this respect there were great variations; the oscillations of the first case were not so great as in the second and third; in the first two, the oscillations were accompanied by evidence of infarct; in the third, the higher ranges were always marked by rigors. In all three, numerous petechiæ appeared on the extremities, and, in the second case, the girl who recovered, these were regarded with considerable anxiety

Vomiting and jaundice were only present in the third case, and although the former was frequent and persistent, the latter was not very severe; the conjunctivæ were tinged, and the urine was dark, concentrated, and contained bile pigment, but the skin generally presented the ashy, earthy discolouration of toxæmia, rather than the yellowness of true jaundice.

In the first two cases, heart murmurs were audible, and they had the usual feature of showing marked modifications at short intervals. In the third case, where the mitral valve was greatly involved, no murmur was audible during the whole of the illness.

In cases of infective endocarditis the variability of the murmurs is a feature of great interest. They may be loud and persistent when the disease is superadded to a previously existent chronic valvular lesion, but, in such circumstances, the murmurs, although persistent, will generally show considerable changes during the progress of the disease. The change is usually in the direction of some softening or blurring of the character of the murmurs; they may still be heard distinctly, but they have not the harsh rough note of earlier days. In the exceptional cases of improvement, in which some of the murmurs may no longer be audible, others may regain the primary ringing character. These changes had been clearly observed in the second of the above cases. On the other hand, in the post-mortem room, we may frequently find extensive lesions, where, during life, there have been either no murmurs, or where the murmurs have been very soft and faint. In the third case I have described, although the mitral orifice was much reduced in size, only just admitting one finger, and, although one of the cusps was found to be covered with a large soft pendulous dark mass, we were unable, even with repeated careful examinations, to detect any murmurs at any time. In one patient the sounds which developed under observation were very soft to-and-fro murmurs in the fourth left interspace. After being audible for a few days, these sounds became more and more obscure, while a soft systolic mitral murmur became evident. Even this last was not, however, persistent; it was so often absent that we were unable to be sure of its existence, and the extensive character of the lesions came as a surprise to many who had examined this patient during his lifetime.

It is in this great uncertainty, connected with the cardiac sounds, that must be found the cause of occasional failure of diagnosis, and I venture to lay much stress upon this point, even though the explanation is elusive.

Changes in the sounds of the heart in the course of ulcerative endocarditis are readily explicable. It is easy to understand that the degree of obstruction, or regurgitation, will vary with the shape of the valves, and this we know must be continually changing owing to the detachment of small emboli, and their dissemination through various channels. But while this explanation is doubtless sufficient to account for alterations in the quality of the sounds, it scarcely seems adequate for the occasional absence of abnormal sounds in the presence of gross lesions. It is conceivable that a shower of emboli might so far free the margins of the valves as to permit perfect adaptation during their closure, but it is difficult to understand why no murmurs should be heard during life, when the post-mortem examination shows large spongy vegetations on the valves. There are, however, two or three circumstances connected with ulcerative endocarditis which seem suggestive. It must be remembered that the deposits are invariably on the side of the valve over which the blood passes in its onward flow, and that the vegetations are extremely soft and spongy. From these conditions it would appear possible that when the mitral valve is affected there should not be sufficient alteration in the shape of the auriculo-ventricular orifice to cause any obstruction to the blood-flow from the auricle to the ventricle, hence no presystolic murmur would be produced. On the other hand, from the soft character of the vegetations, it is equally possible that they should not prevent accurate and complete closure of the two segnents during ventricular systole, hence there would be no regurgitation from ventricle to auricle, and consequently no systolic murmur.

It must be remembered also that these vegetations are not on the thin free edges of the valves, hence, during the ventricular systolic, these parts can still be brought into sufficiently accurate apposition to leave no chink for regurgitation. Unless the valves are unable to meet, owing to dilatation of the auriculo-ventricular ring, it is only when the valves are shortened, or bear hard firm vegetations, that regurgitation is possible. In infective endocarditis, notwithstanding an apparently gross lesion on one or both segments of the mitral valve, the character of the lesion would render the occurrence of a murmur improbable, unless the valve was already altered in shape or structure by some previous disease.

The frequent absence of aortic murmurs in malignant endocarditis may be similarly explained. In both cases, however, it must be remembered that the competency of the valves may be suddenly affected, either by the irregular detachment of recent vegetations, or by ulcerative destruction of valve tissue, and, in either of these ways, murmurs may become evident with some abruptness. In the former case, they will probably be soft and elusive in character, while in the latter they may be loud and ringing, resembling those heard when a valve has been ruptured.

Reference has already been made in one case to the curious onset with vomiting and retching after a succession of rigors, and to the absence of any gastric, hepatic, or cerebral change to account for these symptoms. While the cause of sickness was not disclosed by the discovery of any gross lesion, I am inclined to regard it as being analogous to the vomiting of uræmia or of cholæmia. In these conditions, the symptoms undoubtedly result from toxic central irritation. In malignant endocarditis, although the micro-organisms produce the most evident changes in connection with the cardiac valves, they are circulating and developing in the blood. There seems no ground for doubting that, as one result of their development, some toxic material is formed, which might account not only for vomiting, but also for many of the other symptoms, which are due neither to endocarditis nor to embolic infarcts. It is difficult on any other hypothesis to explain the diversity of symptoms met with in ulcerative endocarditis. According to the predominant symptoms, septic, cerebral, and typhoid types have been described, and all of these are readily explicable on the hypothesis of the presence of a toxin in the circulation.

Occasionally, cerebral symptoms, with malignant endocarditis, may be directly the result of a gross lesion. Not long since a girl, aged 16, was under my care in King's

College Hospital with double mitral murmurs, and with evidence of infarction on the left side of the chest. She suddenly developed a succession of fits, mainly affecting the left side of the body; these were followed by severe headache, pain in the right ear, and frequent sickness. These symptoms were due to the formation of a cerebral abscess of considerable size, which was the immediate cause of death.

To revert to the three cases which have been here described, it will be seen that the first agreed in the main with the general description of ulcerative endocarditis; characteristic micro-organisms were found, wide oscillations of temperature were present, and the chief point of interest was the disproportion between the extent of valvular change and the soft and transient nature of the murmurs heard during life. In the second case, the clinical features were still more definite, but no blood changes were found; the oscillations of temperature were frequent and severe; the cardiac murmurs were louder, although they greatly changed under observation, and the toxic condition, and the evidence of infarct in the lung, left no doubt as to the diagnosis, even though the patient ultimately recovered. In the third case, there was the curious absence of abnormal cardiac sounds, and the predominance of vomiting and epigastric pain, but, in this case, the diagnostic features were the marked toxæmia and the frequent rigors, with great oscillations of temperature. These last might readily have been mistaken for evidence of malaria, but examination of the blood at once negatived this hypothesis. In the absence of an examination after death, it would, I think, have been impossible to be certain that the provisional diagnosis of malignant endocarditis was correct, for even when the heart was examined the amount of injury of the mitral valve was far greater than had been anticipated.

Although infective endocarditis does not invariably lead to a fatal termination, the prognosis is generally so grave, and the diagnosis is frequently so difficult, that it is only by the careful observation of a large number of cases that it is possible to avoid falling into serious error.

ADHERENT PERICARDIUM.[1]

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CHRONIC adherent pericarditis and its results upon the cardio-vascular mechanism are subjects of peculiar interest, both from the clinical and pathological points of view.

During life the difficulty and uncertainty attaching to its recognition are enhanced by the fact that the symptoms accompanying the severer forms of this lesion are indistinguishable from those due to chronic heart failure, while such physical signs as may be regarded as characteristic are by no means always present, or, if they are, are frequently of a more or less indefinite nature. The diagnosis may thus depend upon general inferences, drawn from data often insufficient, with the result that, after a death, it is by no means infrequent to find grave pericardial lesion hitherto quite unsuspected.

From the pathological standpoint, interest mainly centres upon the question of the cause of the marked hypertrophy and dilatation found in some cases, whilst in others apparently no morbid change, save the presence of adhesion within the pericardial sac, is found. Closely connected with this are the subjects of ætiology and prognosis, the former from its relation to rheumatism, the latter from the grave bearing which adherent-pericardium may have upon the duration of life of patients in whom this lesion exists.

The following views are based upon an analysis of 170 cases in which this lesion was found post-mortem, and for which I am indebted to the kindness of the staffs of Charing Cross, St. George's, and the London Hospitals for permission to make use of the records.

In considering the diagnosis and prognosis of this disease, it is very necessary to have in mind certain ætiological and pathological factors, without which it is not possible to arrive at any definite conclusion, and therefore I shall first briefly refer to this aspect of the subject.

Several forms of adherent pericardium have been described, but it is only needful, I think, to consider two of these, viz.,

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[1] Read before the Beckenham Medical Society.

(1) the form in which, whilst there is close adhesion within and obliteration of the pericardial sac, no appreciable clinical or pathological results are produced, the lesion appearing to be entirely without effect; and (2) where adhesion is accompanied by marked cardiac hypertrophy and dilatation, serious embarrassment of the circulation, and early death of the patient.

In the first group of cases there is simple adhesion between the peri- and epi-cardial layers, the adhesions are generally complete and universal, and the serous sac entirely obliterated. In this form there are, as a rule, no, or at least very few, external adhesions, and the heart, enclosed in its pericardium, lies practically free in the thoracic cavity. The direct results upon this organ are entirely negative, and whilst no clinical evidences of the condition of things can be made out, so it does not appear to have any material effect upon the activity or duration of life of the patient in whom it exists.

The ætiology of this form is very obscure and, as will be evident from subsequent tables, it is found in the second half of life, and much more frequently in men than in women. It is not necessarily associated with valvular disease, either of rheumatic or degenerative type, nor is a history of rheumatism obtainable in any but a small percentage of cases. It is probably of a chronic degenerative nature, possibly dependent upon the presence of some toxic material, but, at the same time, is not especially associated with other well-recognised degenerations of the renal or circulatory systems. It is clear, therefore, that adhesion within the pericardial sac is not of necessity of serious import, and some other factor or factors must be sought for in order to account for the results found in the second form already referred to.

The second variety is in the great majority of cases accompanied by a degree of cardiac hypertrophy and dilatation which is often excessive. The adhesions within the sac may be complete or partial, and, as a rule, there is extensive adhesion to the neighbouring viscera and chest wall.

The pericardial layers are thickened to some extent, but not, according to my experience, so greatly as to produce either atrophy of the heart, such as has been described as the result of the constrictive effect of a thick casing of fibrous tissue, or hypertrophy from direct embarrassment of systolic contraction. Occasionally calcification of the pericardium has been found, which in one case, in a woman whom I saw some years ago in St. George's Hospital, resulted in the formation of ascitic fluid, for which she was tapped over fifty times before death took place.

Now it is evident that the differences between the two groups of cases depend upon the condition of the heart which accompanies them, *i.e.*, on the one hand, no appreciable change, and, on the other hypertrophy, dilatation, and grave circulatory embarrassment. These differences are shown in the following table :—

CAUSES OF DEATH.

Decade.	Primary Morbus Cordis.		Causes either unconnected with the Heart, or in which the Heart has been affected secondarily.			Total.
1 - - -	7	65	1	13	78	8
2 - - -	42		5			47
3 - - -	16		7			23
4 - - -	5	17	9	55	72	14
5 - - -	6		17			23
6 - - -	4		21			25
7 - - -	2		8			10
	82		68			150

Out of 150 cases of adherent pericardium, in which the cause of death was specifically stated in the post-mortem records to be the direct result of the heart lesion, 65 were found during the first three decades, and 17 in the last four; whilst, where death had followed upon causes unconnected with the heart, 13 only were found during the first three decades, and 55 in the last four.

Thus there is an almost precisely opposite state of affairs in cases found in the first three and last four decades respectively; and it is further to be noted that, of these 65 cases dying during the first three decades, 42, or considerably more than half, are found between the ages of 10 and 20, whilst of the 55 cases found between the ages of 30 and 70, 38, or again more than half, are found between the comparatively advanced ages of 40 and 60 (*i.e.*, 17 between 40 and 50 and 21 between 50 and 60).

Before discussing the pathological events which may account for this difference, I wish to draw attention to the following tables :—

THE INCIDENCE OF RHEUMATISM.

Decades.	No. of Cases.	History of Rheumatism present.		History of Rheumatism absent.	
1 - - - - -	7	35	4	15	3
2 - - - - -	29		21		8
3 - - - - -	14		10		4
4 - - - - -	8	11	2	36	6
5 - - - - -	18		6		12
6 - - - - -	16		2		14
7 - - - - -	5		1		4
	97	46		51	

In 97 cases, in which there was specific mention of rheumatism in the history of the patients, 46 had a positive and 51 a negative history. Of the 46 with a positive history, 35 were found under the age of 30, and 11 only distributed between that age and 70, whilst, of the 51 in whom a rheumatic history was negative, 15 were found under 30, and 36 between 30 and 70 years of age.

Again, with regard to valvular disease, of 167 cases, in which its presence or absence post-mortem was definitely stated, the results were as follows :—

CO-EXISTENT ENDOCARDITIS.

Decades.	Endocarditis present.		Endocarditis absent.	
1 - - - - -	70	8	14	3
2 - - - - -		44		5
3 - - - - -		18		6
4 - - - - -	21	5	62	11
5 - - - - -		10		16
6 - - - - -		4		25
7 - - - - -		2		10
	91		76 Total = 167	

	Present.	Absent.
Under 30 - - -	70	14
Between 30 and 70 - -	21	62

and, of the 62 in which it was absent, 35 were found between 50 and 70.

From these figures, it may be reasonably concluded that a history of rheumatism is present in a great majority of the cases under 30 years of age, which show adherent pericardium at the autopsy, and that it is absent, in an equally remarkable manner, from those found after 30, and that a condition of things very similar is shown when the presence or otherwise of valvular disease is considered. Here the great majority of cases under 30 present valvular lesion, combined with adherent pericardium, whilst, over that age, an almost equal proportion of cases have healthy valves.

The number of cases, in which the opposite state of things obtained, is few, and may for the moment be neglected.

Now the relation between rheumatism and peri- and endocarditis is, of course, so obvious and well known that comment is unnecessary; but I would point out that it is precisely in those cases, in which a history of rheumatism is absent, that the pericardial lesion is of least effect, and, conversely, where there is antecedent rheumatism the pericardial lesion is fatal early, and most frequently combined with valvular disease, though not necessarily so, for in a small number of cases—viz.: 14 out of 84, under the age of 30—valvular disease was absent; and similarly, though valvular disease was present, in 21 cases out of 83, over the age of 30, the proportion of those, in which it was absent, is nearly three times as great. From these considerations, we may conclude—

(1) That the two types of adherent pericardium are found at different periods of life. The first or grave form occurs under 30; the second form, which has little or no significance clinically, after that age.

(2) That a history of rheumatism is almost always associated with the former, whilst it is absent in the latter.

(3) That the former is accompanied by valvular disease in by far the greater number of instances, whilst, in older cases, an opposite state of things is observed, but that, in a certain

proportion of young cases, valvular disease is absent, the clinical and pathological results being apparently produced solely by the condition of the pericardium; in the older cases, conversely, a few show coincident valve disease.

The cardiac enlargement is generally explained in one of three ways:—

(1) By obstruction to systole leading to cardiac hypertrophy, subsequent dilatation, and failure.

(2) That the effects owe nothing to the pericardial adhesion, but are wholly to be explained by the accompanying valvular incompetence.

(3) By degeneration of the cardiac muscle, occurring with the initial attack of pericarditis, and allowing dilatation to take place. I propose to discuss these propositions, as briefly as possible, but, at the same time, owing to their bearing upon treatment and prognosis, it is necessary to give them adequate attention.

It will no doubt occur to many that possibly the extent of the adhesion within the sac may have something to do with the effects produced, cardiac embarrassment being probably greater in cases in which the adhesion is universal than in those in which it is partial. The following table throws some light upon this:—

Decades.	General Adhesions.	Partial Adhesions.	Total No. of Cases.
1 - - -	11	0	11
2 - - -	40	10	50
3 - - -	23	3	26
4 - - -	16	0	16
5 - - -	25	1	26
6 - - -	27	2	29
7 - - -	11	1	12
	153	17	170

It will be seen, at once, that universal adhesion is the rule, and also that partial adhesions are equally serious with the former; the ultimate result depending upon some factor other than the extent of the adhesion, since partial adhesion is most frequently found at the period when the lesion is followed by the gravest results.

I have already referred to the generally acknowledged fact that simple adhesion between the layers of the pericardium is not necessarily productive of any pathological change, and also that, at least in my experience, the thickening of the serous layers does not bear any definite relationship to the amount of dilatation and hypertrophy present. These, as factors in the results observed, may therefore be neglected.

The part played by adhesion between the epi-pericardial layer and the lungs, chest wall, and mediastinum is by no means so simply estimated, though it is often regarded as the main cause of the hypertrophy and dilatation of the heart noted both ante- and post-mortem. It must be observed, however, that these adhesions vary much both in extent and density, and that their effects may be easily overestimated. The lungs are highly elastic bodies, which could hardly offer much resistance to tractive effort by the heart, and normally systolic diminution in size of the heart is sufficient to cause those organs to follow its movements as the result of atmospheric pressure alone. It seems to me improbable that the existence of adhesion, fixing the lungs to the heart, would be sufficient to produce such obstruction to systole as is implied by the grave results associated with it. At the same time, adhesion in this position, aided by fixation of the heart to the diaphragm, which, of course, is also present, would, by preventing sliding movement, add an additional embarrassment, and increase the work to be performed during systole. With a healthy myocardium, this might not, in certain circumstances, be very serious; but it is otherwise, under existing conditions, where even a slight increase of the work done by the heart must be magnified by its relatively weakened condition.

Where there are adhesions to the chest wall, the case, at first sight, appears somewhat different, for here there is attachment to a fixed point; but I have been frequently impressed by the apparent disproportion between the size of the heart, and the extent and tenuity of the adhesions, and it is also to be borne in mind that there is little tendency for the heart to leave the chest wall during systole. Too much must not be made of "systolic recession" of the intercostal spaces, found clinically, as this sign is by no means confined to cases of adherent pericardium, but can be seen in any enlarged and vigorously beating heart in thin persons.

Again, extensive adhesions, with great cardiac enlargement, must have followed rather than have preceded this condition, or, at least, have been formed *pari passu* with it, and can, therefore, have played little part in its production. It may be concluded that external adhesions, whilst hampering the heart's action, are insufficient to produce the results observed.

The effect of valvular disease upon the heart in these cases has been differently regarded by writers upon this subject, some looking upon it as a main cause of the enlargement, others assigning to it a less important *rôle*.

Where two conditions of this kind exist concurrently, it is difficult to estimate the precise value to be ascribed to each respectively. It is certain, however, that, in cases, in which valvular disease is absent, *e.g.*, 14 out of 84 in cases under 30 according to my table, nothing but the condition associated with the pericardial lesion existed to account for the heart failure.

If the table, showing the occurrence of valvular disease is referred to, it will be seen that, out of 91 cases, in which the combined lesion was present, 70 had come to autopsy before the end of the 30th year, and that 21 are distributed over the remaining decades up to the 70th year. From this it is clear that, whilst the combined lesion is not incompatible with long life, it may, in certain cases, be remarkably fatal. Again, of these 70 cases, 44 died between the ages of 10 and 20. On the other hand, of 76 cases, in which valve lesion was absent, 14 died before 30, and 62 reached an advanced age. The conclusion to be drawn is, that it is the type of pericardial adhesion present, and not the valvular incompetence, which determines the fatal result. That the co-existence of valvular disease and chronic adherent pericarditis is a matter of moment can hardly be doubted, but that it is the former, which mainly determines the train of clinical and pathological events, is improbable from the foregoing considerations, as well as by the comparative infrequency, with which valvular incompetence, uncomplicated by pericardial lesion, is followed by pathological and clinical phenomena of a like severity.

The most tenable explanation of the enlargement is that it is due to the action of the rheumatic poison upon the heart muscle fibres, the effect of which is either to allow of dilatation taking place, as the result of diastolic pressure, or, what amounts to the same thing, to reduce its contractility, and, by preventing the normal systolic evacuation of the ventricular contents, to lead to dilatation and subsequent hypertrophy.

This view receives support from the close relation to rheumatism, the large proportion of cases in which early death occurs independently of the extent of the adhesion, and from the circumstance, recently pointed out by Dr. Theodore Fisher, that acute pericarditis of pneumococcal or septic origin is not accompanied by cardiac dilatation, though from the severity of the inflammatory process an opposite effect would be expected. Moreover, rheumatic dilatation is a well-recognised phenomenon accompanying acute rheumatism, as apart from associated pericarditis. The dilatation, according to this view, is evidently not the result of the direct spread of inflammation from the pericardium, nor is there usually such microscopical evidence of change in the cardiac muscle as would account for the condition of things observed, and this is in agreement with results obtained by Tawara from an examination of a large number of hearts, from patients dying from cardiac failure, in which he found no microscopical evidence of morbid change sufficient to account for the clinical picture. It has been held that the enlargement is the result of dilatation, following upon inflammatory softening of the pericardium consequent upon the loss of support during diastole, which the experiments of Hill and Barnard show to be one of the functions of the normal pericardium. It would lead too far to discuss this view fully, and no doubt some loss does occur, but that it is a serious factor is negatived by the observation of Dr. Theodore Fisher already alluded to.

The train of events, which leads up to the clinical picture noted in connection with chronic adherent pericarditis, appears to be that the main pathological condition, associated with this lesion, is one of dilatation, the result of the action of the rheumatic poison upon the heart muscle, and subsequent hypertrophy. Dilatation takes place during the acute or sub-acute periods of the phase, which precedes the chronic adhesion. In a few mild cases it may pass off, but, in the great majority, it does not, and hypertrophy and external adhesion follow, resulting in a condition of unstable equilibrium, in which the constant tendency is to increase dilatation and failure, owing partly to a certain amount of embarrassment to systole, caused by external adhesions, but mainly to a permanent damage to the heart muscle, in a measure resembling those cases of chronic cardiac failure in more advanced life, in which there is nothing to account for the symptoms but functional change in the properties of the heart muscle, and which is generally accompanied by progressive decline in its powers.

If the above view is correct, it is evident that valvular incompetence will exaggerate the tendency to failure by making an additional demand upon the cardiac reserve. At the same time everything depends upon the extent of the original damage sustained by the muscle; where this is slight, the outlook is better than where the converse has happened.

In dealing with the clinical aspect of this lesion, I need hardly say that I shall confine myself entirely to that form, which is productive of signs and symptoms, and that I need not add much more to the ætiological side than has already been indicated.

The main factor is rheumatism, but necessarily anything which may produce acute pericarditis will also stand in a causal relationship to the chronic form, if the patient survives long enough to allow the subsequent changes to develop.

The overwhelming importance of rheumatism is clear from the frequency with which a history of this disease can be obtained, and, where it is absent in young cases, it is still needful to bear in mind that its slight articular manifestations in childhood may have been entirely overlooked, and lead to a wrong impression being given.

With regard to age, it is more common in early life. Out of 82 cases dying of morbus cordis in which there was adherent pericardium present, 65 were found before the end of the 30th year, and only 17 between that age and 70. It is more frequent in males than females, in the proportion of 53 to 34 up to the age of 30; after that age, males predominate still more, viz., 66 to 17, but this is due to the occurrence of the simple form being almost confined to this sex.

THE INFLUENCE OF SEX.

Decades.	Males.	Females.	No. of Cases.
1 - - -	7	4	11
2 - - -	29	21	50
3 - - -	17	9	26
4 - - -	10	6	16
5 - - -	20	6	26
6 - - -	26	3	29
7 - - -	10	2	12
	119	51	170

DIAGNOSIS.

The diagnosis offers great difficulty, and is always somewhat uncertain, though its importance is very great having regard to what has gone before. This difficulty depends upon the absence of any constant symptom or sign which can be regarded as distinctive, also upon the possibility that its existence may not be thought of, attention having been diverted by the presence of valvular incompetence.

The symptoms are, in a word, those of cardiac failure of whatever origin, such as dyspnœa on exertion, hepatic enlargement, visceral congestion, œdema, and ascites, etc., and offer nothing upon which to base a diagnosis. The most important point is a comparison between symptoms and physical signs, whether the former can be entirely accounted for by the latter, or are disproportionate to them. It is characteristic of adherent pericardium, so far as anything can be said to be so, to find symptoms of cardiac failure altogether out of proportion to the signs observed upon physical examination.

Another point of importance is to find evidence of cardiac enlargement greater than the signs of valvular disease present will account for. In late life, cardiac failure is usually associated with myocardial feebleness, but, under 30, when the power of compensation is at its best, and chronic myocarditis is unusual, serious cardiac failure, unless to be accounted for by severe valvular disease, is highly suggestive of pericardial lesion, which is increased if a definite history of rheumatism can be obtained.

The most useful physical signs are those which belong to inspection. Prominence of the pericardium is often present, precordi and is frequently marked. It is the result of great cardiac enlargement occurring at the time when the ribs are soft and yielding. Its position is generally limited to the left side of the sternum over the precardial area. As a sign of adherent pericardium, it is of doubtful value, being only an indication of great cardiac hypertrophy, which, of course, is not necessarily confined to the class of case under discussion; still, when present, and more especially in the absence of severe aortic regurgitation, the possibility of adhesion within the pericardial sac should be borne in mind.

Systolic recession of the intercostal spaces was at one time supposed to be diagnostic of pericardial adhesions, but, as I have already pointed out, it can be seen over any hypertrophied and well-acting heart, if the chest wall is sufficiently thin to allow it to occur; there is no doubt that it is caused by atmospheric pressure producing depression of the intercostal tissues when the heart shrinks in size on going into systole. It is merely an evidence of enlargement, and not the result of traction upon the spaces. It has also been shown by Dr. James Mackenzie that whenever the right ventricle comes into contact with the chest wall, as for instance in the great right-sided hypertrophy met with in cases of mitral stenosis, recession of the intercostal spaces takes place.

Systolic recession of the apex beat area probably does not really occur; indeed, it is difficult to understand how a receding movement of this kind, such as would be needful to cause systolic depression, could be produced when the physiological movement of the heart is considered. It seems more likely that its appearance is really due to some part of the right ventricle coming into contact with the chest wall, such as occurs in cases of great hypertrophy of the right side, pushing the true apex away. The actual position of the apex beat is of no value, except as being an indication of hypertrophy. It has been said to remain fixed and immovable on turning the patient from side to side, owing to the presence of adhesions anchoring the heart to the chest wall; but this, again, is a somewhat uncertain sign, though of value when unmistakably present.

Another sign of importance, as suggesting the possibility of the existence of pericardial adhesion, is the extent of the area of pulsation. According to Professor Osler, it may extend from the 3rd to the 6th interspaces, and, in extreme cases, from the right parasternal line to outside the left nipple.

Attention has been called by Dr., now Sir John, Broadbent to a valuable sign occasionally found in connection with this lesion. This is the presence of systolic retraction of the 7th and 8th ribs in the left parasternal line, and of the 11th space on the left side behind. It is said to be due to a systolic tug exercised by the heart upon the diaphragm when there are extensive adhesions between it and that organ. It is best obtained by making the patient sit up and hold his breath. It may also be present in thin-chested persons with great cardiac hypertrophy, and, for this reason, its value is less than it would otherwise be. The sign is said to be of frequent occurrence, but, though I have seen it upon occasion, I should not regard it as common. With respect to its causation, I must again refer to the absence of physical signs, in that form of adherent pericardium which has been called simple; that is, where there are no clinical signs or pathological change. I pointed out that, in these cases, the adhesions were universal, which implies fixation to the diaphragm, and though the fibrous adhesions are not very firm, and are often easily broken down, still they exist, nor are they of such a length as would allow of the heart making a movement of excursion without exercising a pull upon the central tendon, evidences of which are not found clinically. Moreover, as already remarked, it may be present in cases of simple hypertrophy, when that is considerable as apart from the existence of adhesion. I am inclined to regard it as due to one of two causes, not necessarily associated—first, atmospheric pressure, and second, a real pull upon the diaphragm by the heart, which can only occur when there are strong and extensive intra-pleural adhesions in the left pleural cavity in the neighbourhood of the heart. Under these conditions, the lung is pushed to one side by the greatly hypertrophied heart, fixed in this position by the adhesions, and may thus act as a fulcrum, and allow a tug upon the diaphragm to occur, and manifest itself by systolic recession in the manner referred to.

It is easy, I think, to over-estimate the effects of fixation of the heart to the diaphragm and chest wall, unless there is also a condition of things in the left pleural cavity and lung such as I have suggested. In moderately thin persons, very marked systolic recession can be seen in the substernal angle under the influence of excitement, which is obviously not due to any traction upon the diaphragm, but which is undoubtedly the result of atmospheric pressure, and would be increased by hypertrophy and dilatation of the right side.

Diastolic collapse of the veins of the neck is of no value as a sign of pericardial adhesion.

Upon palpation, a diastolic shock is sometimes observed, and is by some regarded as the most important physical sign. It has been ascribed to the sudden rebound of the heart after systole. I must confess that I have been unable to satisfy myself of its presence as apart from perceptible closure of the aortic or pulmonary valve, and any rebound of the heart after systole seems to me to be highly problematical.

Percussion reveals an increased area of dulness which may or may not vary with respiration. This variation is due to expansion of the left lung and consequent encroachment upon the cardiac area, where it is absent it indicates fixation of the edge of the lung by pleural adhesions, but is, for practical purposes, often useless.

Auscultatory phenomena are very uncertain, and there is none that is really characteristic. From the frequency with which endocarditis accompanies the pericardial lesion, murmurs, originating at one or other of the valves, are commonly present, and even in those cases in which there is no valvular disease, incompetence, from dilatation of the mitral or tricuspid orifice, is the rule. The presence of a more or less well-marked presystolic murmur has been described in the absence of stenosis of the mitral valve.

In some instances, a pulsus paradoxus has been found, and I have observed cases in which it has occasionally been well marked. It is not to be regarded as pathognomonic, but its existence should bring the possibility of pericardial adhesion to one's mind, especially if there are other signs compatible with this lesion.

It will be evident from the foregoing résumé that there are no physical signs or symptoms by which the presence of adherent pericardium can be recognised with certainty. Many cases must, and do, go undiagnosed; nevertheless, it is possible to arrive at a correct diagnosis in a fair proportion of them by taking into account all the factors present. The great difficulty occurs when the question is complicated by the existence of aortic regurgitation. Here all the signs, enumerated in connection with adhesion within the pericardial sac, may be found, and it may be quite impossible to come to a decision after the most careful examination. In such cases everything depends upon how much regurgitation there is, and how far this can be diagnosed. Where there is little, the matter is less difficult, and the diagnosis may be made; but where the converse is the case, it may well be, as already said, quite impossible.

The whole question of diagnosis is dependent upon the correlation of signs and symptoms, and upon the relation of the signs to one another.

The most important thing is to remember the possibility of the existence of adhesion, and they are suggested whenever serious symptoms of cardiac failure are found in a young patient, in whom the physical signs do not appear sufficient to account for their severity. For example, a patient, aged 15, has great dyspnœa, cyanosis, and œdema, with, possibly, ascites. On examination, nothing is found to account for it, beyond cardiac enlargement, accompanied by a systolic apical murmur; there is, perhaps, well-marked epigastric pulsation. In such a case, apart from the existence of renal disease, or some other cause of cardiac failure, with or without a history of rheumatic fever, there is nothing to account for the severity of the symptoms, and the existence of pericardial adhesion is rendered extremely probable, for one does not expect to find, at that age, more than a degree of failure, which, in the absence of severe valve lesion, is comparatively slight, and readily yields to treatment. Indeed, as a practical rule, I regard grave heart trouble of this kind as suggestive of pericardial adhesion, though I should not like to lay it down as more than a possibility to be considered.

Or, again, in a young patient, there is evidence of great cardiac enlargement, the precordium is prominent, and the impulse of wide extent; there may, or may not be, diaphragmatic phenomena already described. Palpation reveals a forcible action, and auscultation the presence of a murmur of mitral or tricuspid origin. In such a case, unless old-standing aortic regurgitation were found, a diagnosis of chronic adherent pericarditis should be seriously considered based upon the existence of a degree of cardiac enlargement altogether greater than the valvular lesion would account for. In an elderly patient severe hypertrophy may accompany latent renal mischief and arterial degeneration, but in young persons these complications are rare in the absence of a definite history from which they might be inferred.

To sum up: the chief diagnostic points consist in a recognition of the possibility of the lesion being present in any case in which, in early life, the cardiac symptoms are grave, but the signs slight, or in which excessive enlargement of the heart exists in the absence of aortic disease.

PROGNOSIS.

Prognosis and diagnosis are intimately associated. Where the latter is possible, the former must be looked upon as excessively serious. It is probable that chronic adherent pericardium is the gravest cardiac lesion to which young people are liable. Ultimately, in a great majority of cases, all depends upon the cause of the lesion. In early life, this is almost always rheumatism, and the outlook is grave, for the greater number die before the end of the second decade, and, of those remaining, few are left after the end of the thirtieth year. After that age has been reached, the prognosis becomes very different, for the cause of the adhesion ceases to have been rheumatic, but is probably degenerative as already mentioned.

The degree of cardiac enlargement is a point to be borne in mind. Where this is excessive in proportion to the age, the prognosis is bad.

The co-existence of valvular disease is probably an additional cause of cardiac embarrassment, but how far this is so is a little doubtful. Some degree of regurgitation at the mitral or tricuspid orifices always exists after a certain amount of dilatation has occurred, owing to stretching of the rings bearing the valve cusps, and cases, in which endocarditis is absent, are too few to form a definite basis for opinion. The probability is that the earlier regurgitation occurs, the more seriously must it be regarded, and, consequently associated organic valve disease is of graver moment than relative incompetence.

In later life, the presence or absence of pericardial lesion is apparently not a matter of which accounts need be taken—no effects of any kind are produced, and a diagnosis is not possible.

AN ACCOUNT OF THE THEORY AND EMPLOYMENT OF BIER'S METHOD OF TREATMENT BY PASSIVE CONGESTION IN CASES OF RHEUMATOID ARTHRITIS, TUBERCLE, SEPSIS, AND VARIOUS OTHER CONDITIONS.

By A. W. WAKEFIELD, M.A., M.B., B.C.

(*Continued.*)

(5.)—(*a*) RHEUMATOID ARTHRITIS.

CONGESTION should be produced by means of the bandage, and may be maintained for any length of time up to 22 hours out of the 24, due care being taken that the continuous pressure does not injure the part.

I have now been able to carefully watch and record the results of treatment in over 20 of these cases, besides a great number which I have treated, but which I have not been able to observe so closely. The disease in many of these cases was of a very severe type, the patients only coming up to hospital after their private medical adviser had found himself unable to do anything further to help them.

Amongst all these cases there were only two which congestion was unable to relieve in any way. One was a woman whom I only saw two, or perhaps three times, and I am by no means confident that the treatment was satisfactorily carried out. The other was an old man (Case 12) who had had the disease for forty years. Most of his joints were more or less ankylosed, but, as his condition had for a long time ceased to progress, there was little or no pain. He was, moreover, the subject of severe psoriasis, and congestion made the psoriasis worse, without in any way benefiting the rheumatoid arthritis. In every other case congestion relieved the patient to a varying extent. In a few cases the only result was a slight, and very temporary relief from pain. In most cases the pain decreased or entirely vanished in the most striking fashion about an hour after the first application of the bandage, and for some weeks the patient continued to improve with this treatment. The patient then appeared to acquire a tolerance towards congestion and the pain began to recur. After stopping the treatment for a week or two the bandage again gave more or less relief in some cases, while in others it seemed to lose all effect.

After applying a bandage at the wrist for pain in the hand, I several times noticed a peculiar sequel, but am unable to say whether this was directly due to treatment or merely a coincidence. The pain in the hand entirely disappeared, but after a time reappeared in the elbow. The site of the bandage was consequently transferred to the arm above this joint, and the pain went away, only to come on, after a week or so, in the shoulder.

In only one case (Mrs. B., quoted later) has pain been entirely and always relieved by congestion.

Stiffness I have found to be benefited by congestion in only a small proportion of cases, in some of these, moreover, the improved mobility was only temporary, in one (S.D 1523/06, aged 49)[1], however, it was marked and lasted for some months. In this case the patient for three weeks improved rapidly in every way, with no other treatment than congestion; massage, and passive movements were then ordered additionally.

Swelling appears to be very little affected by congestion, but, after watching and carefully keeping a record of the measurements in a series of cases, I have come to the conclusion that swelling cannot be taken as a gauge of the result of treatment.

There is often considerable difficulty in estimating the effect of treatment in cases of rheumatoid arthritis, for the condition varies so greatly from day to day, even, sometimes, from hour to hour, in an untreated case that one is naturally sceptical when some change is attributed to some definite treatment. It is consequently only by watching the effect of one form of treatment on a considerable number of cases that any confidence can be established in that treatment.

The variable results obtained by congestion, as by any other method of treatment, are doubtless due, partially, at least, to the fact that the disease long known as rheumatoid arthritis, has now been shown to include different pathological conditions, and these are very probably due to different causes.

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[1] Here, as in all future references to London Hospital cases, the figures indicate the registered number of the case, and the year of admission.

There is, moreover, great probability that, on further investigation, "rheumatoid arthritis" will be still further subdivided. It is, then, only natural that different pathological conditions, due to different causes, should be differently affected by the same treatment.

The symptom on which I have laid most stress in estimating the result of treatment is pain. For many reasons this is by no means an infallible guide, but, due consideration being given to the general condition of the patient and to other symptoms and signs, I think that the extent of the pain suffered forms the most trustworthy indication that we have as to the progress of the case. Pain is naturally the symptom most prominent to the patient himself, and it is that by which he forms his estimate of the value, not only of the treatment, but also of the medical man prescribing the treatment. Moreover, although pain is a subjective symptom, incapable of exact measurement, the magnitude of which varies largely with the temperament of the patient, nevertheless an observer may form a fairly accurate estimate of the true severity of pain by numberless small points, and above all by the quantity and quality of sleep which the patient is able to enjoy. Therefore when a person, who, owing to pain, has not for months had a single good night's rest, comes into hospital, is treated with congestion, and, in a strange bed, in a strange ward, surrounded by strangers, spends a really good night, it is a striking proof of the pain relieving attribute of the treatment (S.D. 1523/06, 49). I have had several such cases; in some of them the improvement has continued, in others it has been but temporary.

For the sake of accuracy, I have attempted, where possible, to record the patients' own words in describing their views of the treatment by congestion. They are not, as a rule, prejudiced in its favour, for, like Naaman the Syrian, they generally scorn so simple a process.

After an extensive trial of this form of treatment for rheumatoid arthritis, I have come to the conclusion that congestion is far from being a panacea, but that it is as valuable a means as any we possess of combating this fell disease. We know of no specific treatment which will certainly benefit every case, and the most popular methods of treatment, such as dowsing baths, massage, aspirin, potassium iodide, etc., if long continued, nearly always, after a time, lose their effect, the patient developing a tolerance. To this rule congestion is, in the large majority of cases, no exception.

Following Bier's directions, I at first prescribed continuous treatment by congestion, only having the bandage removed for from two to four hours daily. Recently, with a view to preventing the acquirement of tolerance, I have, in suitable cases, ordered the bandage to be applied only when the pain comes on, and to be removed when it disappears. As most patients of the hospital class are below the average intelligence, and have to work by rule of thumb, I have not as yet been able to adopt this method in many cases. In one case, however, a private patient, it has been remarkably successful. It has also answered fairly satisfactorily in another case (E C. 395/07, aged 32).

A close personal supervision is an absolute necessity if the best results are to be obtained. I have again and again been informed by a patient that the treatment was useless, and, on investigation, have found that the bandage had been quite improperly applied by the patient, or an attendant. The same patient, after proper application of the bandage, has again and again confessed that "it was quite different now, and the pain had gone." In most cases the unskilled person applies the bandage too loosely, occasionally, however it is too tight.

An interesting point, which is mentioned by Bier, is the fact that when one joint only is treated by congestion, there is frequently a marked simultaneous improvement in all the other affected joints. This phenomenon is not peculiar to treatment by congestion, but has frequently been observed by various authorities to occur with other forms of local treatment. It is of course possible to attribute this to a passing phase of improvement in the natural course of the disease, but this is scarcely a satisfactory explanation considering the frequency of the occurrence. A more convincing, and withal scientific, theory is that named by Wright "Auto-inoculation."

Admitting the theory that rheumatoid arthritis is a condition brought about by micro-organisms, it is quite in accordance with theory and with practice that congestion of the focal area should produce auto-inoculation. The organism, or organisms, causing rheumatoid arthritis, have unfortunately not yet been isolated, and this theory is therefore, in the case of rheumatoid arthritis, not yet capable of proof. However, as I have already mentioned, Dr. Western and others have shown that, after congestion of a local tuberculous lesion, the opsonic index of the blood is considerably raised to the tubercle bacillus.

Moreover, if this theory is accepted, it is obvious why congestion after a time often ceases to produce beneficial effect. We know that, in cases of tubercle, if inoculations of tuberculin are made during the negative phase, the opsonic index is further lowered, and injury instead of benefit results to the patient. Consequently injections are regulated by the opsonic index. This control we are unable to exercise in the case of rheumatoid arthritis, and the probability is that, after a time, auto-inoculation does not coincide with a positive phase.

Thus it will be necessary to isolate the organism before we are enabled to regulate the dosage scientifically. Till then we can but work blindly, attempting by experiment to discover successful, though empirical, rules for treatment.

I have found it advantageous to combine other forms of treatment with congestion. For instance, full dieting, the administration of oil, malt, iron, arsenic, or quinine, as indicated, or the local employment of massage and passive movements, also the local use of a woollen wrap to protect from cold, may all be found of use. And of course the general health should receive attention.

The two following cases illustrate the value of congestion. Mrs. B., private patient, first suffered from lumbago in 1902. There was no further trouble till 1905, when she began to have occasional attacks of pain in the ankles and knees (chiefly the left), also the right shoulder, elbow, wrist, and hand. The onset was attributed to sleeping in a damp house. She had taken medicine, the ingredients of which I have not been able to ascertain, and had tried sulphur baths, without any benefit. These attacks generally lasted about four days, and the pain was so severe that the patient could often not sleep.

I first recommended treatment by congestion in the spring of 1906. Since then there have been at least nine attacks, and in each case the pain has been completely relieved by the bandage (a cotton one).

In the case of the knees, the pain was relieved about three-quarters of an hour after the bandage was first applied, and there has been no recurrence in these joints. The pain in the hand has usually disappeared after about half an hour of congestion, but there has generally been swelling afterwards.

The treatment still remains as efficacious as it was originally.

In this case congestion proved to be of more permanent value than in most cases of rheumatoid arthritis.

C.P., 1325/06, female, aged 36. Onset two and a half years previous to admission to hospital after "cold in head, thought to be influenza." Pain constant, worse at times, especially on getting up. Worse when joints not swollen. Chief pain in right knee and right shoulder, but present in nearly all the joints.

Patient had been to various medical advisers, and had tried the following remedies at different times:—

Internal.—Pot. Brom., Tr. Valeriani, Sod. Sal., Phenazonum, Sod. Bicarb., Ammon. Carb., Pot. Iod., Pot. Bicarb., Nux. Vom. Calc. Chlor., Salol, Syr. Hypophos., Liq. Arsen., Syr. Glycophos. Co., Spt. Chlorof., Aspirin. (gr. xx. t.d.s.).

Local.—Chloral Hydrat. Camph. a.a., Tr. Iod. and poultices over it, Dowsing baths and massage for three months.

The only treatment which had appreciably alleviated the pain was that by dowsing baths and massage. The baths had entirely relieved the pain during the periods of treatment, but an hour or two afterwards the pain had always become worse than before treatment.

On admission to the London Hospital, congestion for 20 hours daily was ordered for the right knee and the right shoulder, the bandages being removed daily from 8 a.m. to 10 a.m. and from 6 p.m. to 8 p.m. The pain was alleviated within a few hours, and, from that time, the patient began to sleep well at night. After two days of treatment the pain almost entirely disappeared for a week, no other treatment being employed but rest in bed and the administration of a mixture containing gentian, rhubarb, and sodium bicarbonate. At the end of a week the patient said that previous to admission she had never been without pain, except while actually in the electric bath, but that for the greater part of each day during the preceding week she had experienced no pain at all. This improvement was attributed by the patient to the rest from her usual work.

After two weeks' treatment, patient said "it (congestion) had certainly done her more good than any other form of treatment."

Pain then began to return an hour or two before the bandages were taken off, and was, I think, caused by the pressure on the skin and nerves, for on loosening the bandages at the onset of this pain it disappeared. Congestion was accordingly stopped for the shoulder, and a mixture of guaiac and olive oil was applied. The shoulders gave no further trouble while the patient was in the hospital.

After two and a half weeks' treatment the rheumatic pain began to get worse in the left knee, which had become much worse than the right knee. Congestion was consequently ordered for the left knee also, with a distal bandage from the foot.

Two days later the left knee was better, and the right was again the worse, consequently the distal bandage was applied to the right instead of the left leg. Both knees then became better for nearly a fortnight, when the pain came on again badly, and, being unable any longer to relieve it with congestion, which appeared to have lost its efficacy, a mixture of guaiac and olive oil was applied locally. This alleviated the pain, but I doubt whether the improvement was more than temporary, for the pain was beginning to return ten days later, when I lost sight of the patient.

This case is a good example of what I have found to be the average result of congestion in cases of rheumatoid arthritis.

(*b*) TUBERCLE AND MIXED INFECTIONS.

Bier, in the year 1892, first commenced his experiments in treating tubercle of the bones, joints, tendon sheaths, etc., by means of congestion. He at first employed periods of congestion extending up to about 22 hours out of the 24. His results were conflicting. Some cases did very well, a few became rapidly worse. These results were published in 1893,[1] 1894,[2] and 1895.[3]

Then, dissatisfied with the results obtained by his previous technique, for nearly 10 years Bier confined his attention to experiments with a view to bettering his methods, and so safeguarding the disciples of his teaching, and their patients, from the evil results which had occurred in a small proportion of his previous cases.

Having then, as he claimed, so improved this treatment that the veriest novice, if he would only take the trouble to study the rules for treatment, could do no possible harm, Bier once more published a full account of his improved methods.[4] In this he recommends much shorter periods of congestion, and he lays great stress on the signs and symptoms indicating that, for one reason or another, the congestion is injurious.

Bier now directs that the bandage shall never be applied in the case of active tubercle for more than two hours daily; as a general rule he recommends its use for one hour only.

Unskilful congestion in cases of tubercle may do much damage; this is generally due to too great, too lengthy, or too frequent congestion. Some patients think that if congestion is good, more congestion must be better. It is consequently essential to closely supervise each case, at least until the patient can be relied upon to carry out directions.

Bier holds that congestion for one hour, even though it may be excessive in character, can do no harm. As the case improves, congestion may be produced less frequently.

Cold abscesses, he says, frequently occur, but are not a contra-indication to the continuance of congestion. They should be evacuated as soon as diagnosed. Treatment by congestion may be continued as before, but the bandage and dressings should be removed during the period of congestion, and a light piece of sterile gauze loosely placed about the wound to catch the discharge, which is often profuse.

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[1] "Behandlung chirurgischer Tuberkulose der Gliedmassen mit Stauungs-Hyperæmie," v. Eschmarch's *Festschrift*. Kiel u. Leipsig, 1893, p. 54.

[2] "Weitere Mitteilungen über die Behandlung chirurgischer Tuberkulose mit Stauungs-Hyperæmie," *Verhandlungen der deutschen Gesellschaft für Chirurgie*, 1894, 2 Bd., p. 94, *und Archiv. f. klin. Chirurgie*, 1894.

[3] "Behandlung der Gelenktuberkulose mit Stauungs-Hyperæmie," *Berliner Klinik*, November, 1895.

[4] Bier: *Hyperæmie als Heilmittel*, 1906.

The degree of congestion to be produced in tuberculous cases is only a matter of some slight difficulty, but the length of time during which congestion should be maintained for tubercle, and the frequency with which such periods should be repeated, are matters on which there is very considerable divergence of opinion. Other authorities have obtained good results by using longer periods than those recommended by Bier.

A short time after the publication of Bier's earlier works on the subject, the treatment of tubercle by congestion was attempted in this country at the London Hospital and elsewhere. The results were by no means good, and treatment by congestion thereupon fell into disrepute. I have been able to prove that some of these evil results were due to excessive congestion, and I believe that they were all attributable to this cause. For those who made these trials naturally followed the directions laid down by Bier in his earlier publications, and Bier himself now acknowledges that the congestion he employed at that time was excessive for tubercle. Since he reduced the periods of congestion his results have been much more successful, and his series of cases, from April 1, 1903, to August 1, 1904,[1] is so striking that it will bear quoting at some length.

This series does not consist in any sense of picked cases, but includes all the cases treated by Bier during that period. Congestion was usually employed for one hour, never for more than three hours, daily.

Hand and Wrist.—Seventeen cases, four originally having sinuses. Abscesses developed, and were evacuated, in five. Three healed with full, twelve with satisfactory, mobility. The remaining two improved. The average length of treatment was twelve months.

Elbow.—Eleven cases. Five originally had sinuses. Eight developed abscesses which were opened. Eight healed, the three others improved. Normal movements were not obtained in any case, but fair mobility in all. The average length of treatment was nine months.

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[1] *Hyperæmie als Heilmittel*, 1906, p. 269, *et seq.*

Foot.—Thirteen cases, eight with sinuses. Eight developed abscesses. Eight were cured, three improved, one remained unaltered, and one sought treatment elsewhere. Three cases obtained full, the remainder fair, mobility. The average length of treatment was ten months.

Knee.—Thirteen cases, two early, one with sinuses. Three were cured, two with full movements, one with stiffness in good position, two improved but were completely ankylosed. In the other eight cases, after a short trial of congestion, resection was performed.

Shoulder.—One case which was cured with full mobility. Except in the case of the knee no joint was resected.

The following table shows the percentage of cures for each joint:—

Hand and wrist - -	68	per cent.	cured.
Elbow - - -	72·7	„	„
Foot - - - -	61·5	„	„
Knee - - -	23	„	„

The durability of the cures is demonstrated by three severe cases, cured by congestion, quoted by Bier[1] as still well after 14 and 15 years.

In most cases Bier avoids immobilisation as it tends to cause ankylosis. He generally allows the patient to move the part freely, provided that this causes no pain, but the patient is warned not to strain it in any way. This treatment, however, is modified in the case of the knee and ankle joints, which are supported by some form of splint in order to avoid undue strain. The splints are removable in order that active and passive movements may be undertaken.

The above statistics afford evidence that this treatment does not retard convalescence.

Other authorities recommend longer periods of congestion than the above. For instance, Messrs. Cheyne and Burghard, in their *Text-book on Surgery*, published in 1900 (Part IV., p. 122), recommend that congestion should be maintained for from 14 to 18 hours out of the 24. Again, Messrs. Rose and Carless, in their *Text-book on Surgery* (6th edition, 1906, p. 665), direct that congestion should be employed for 2 or

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[1] *Hyperæmie als Heilmittel*, 1906, p. 270.

3 hours daily. Neither of these works quotes the results obtained by the methods recommended.

Dr. James Laurie, of Greenock, has, however, most kindly given me permission to quote the following, hitherto unpublished, cases which were treated with considerably longer periods of congestion than those advocated by Bier, and in all of these cases excellent results were achieved. I am exceedingly indebted to Dr. Laurie for his kindness in supplying me with all the details.

The first case was that of a boy, aged 14, with a tuberculous left ankle. Immobilisation had been tried without benefit. Iodoform emulsion was then injected on two occasions. This treatment "seemed to stay the progress of the disease, but did not clear it up." Congestion was then employed for some hours every morning and evening for two months, and every fourteen days a distinct improvement was noticed, "absorption seemed to go on rapidly, and the joint resumed its normal contour." It is now nearly three years since treatment by congestion was begun, and the boy is running about freely. There has been no recurrence.

The second case was that of a boy with phthisis, and well-marked tuberculosis of the left ankle joint, which looked as if it were breaking down. Iodoform emulsion was injected, and there was some improvement. Shortly afterwards congestive treatment for several hours every day was commenced, and the improvement was very marked. Now this left joint is almost as good as the right.

The third patient was a child, aged 3, with open tuberculous ulcers leading to diseased bone of the carpus. The bandage was lightly applied, and congestion was maintained for ten hours without pain. This was the only treatment which did any good. The ulcers showed signs of healing at the end of a week, and some had healed when the child was removed from hospital.

The last case of tuberculosis was that of a man, aged 23, who had been under treatment for a year with tuberculosis of the ankle joint, and abscess formation. The ankle had first of all been injected with iodoform emulsion, and this had produced some improvement, but, at the end of eleven months, there was still a discharging sinus in front of the ankle, and a generalised infection of all the tissues around. At the end of this time the sinus was slit up and painted with pure carbolic acid, and treatment by congestion for several hours daily was commenced. A month later the sinus had filled up and was cicatrising, and the ankle was "50 per cent." better in the opinion of all concerned. This improvement, however, did not continue, and some months later amputation was deemed advisable.

In a letter, discussing treatment by congestion, Dr. Laurie writes: "I think I see in it (congestion) a valuable means of treatment in tubercle and mixed infections." Dr. Laurie has, however, recently reduced the periods of congestion in tuberculous cases to one hour daily.

Congestion has also been employed for some years in Edinburgh for tuberculous cases by Professor Chiene and other surgeons. Good results are reported.

On the Continent, congestion for tubercle has been strongly advocated by A. Henle[1] and by Habs.[2] The latter, having treated nearly 200 of these cases, recommends that in all tuberculous affections, to which this method is applicable, congestion should always be tried in the first place.

Professor Franz Kœnig, of Berlin, however, states that he has found congestion to be harmful in cases of tuberculosis.[3]

The second method of producing congestion, namely, by means of the suction apparatus, is especially useful in tuberculous cases with discharging sinuses, or when tuberculous abscesses have been opened. The routine method in Bier's clinic at Bonn is to treat these cases for three-quarters of an hour daily. In some cases I have followed this rule, in others I have considerably modified the periods of congestion, in one case reducing treatment to half an hour once a week (W. R., aged 5). The patient was a child living in the country, and she was not able to attend more frequently. She also received occasional tuberculin injections from Dr. Western, and she did very well.

It is generally in the case of small children that I modify treatment, partly because the skin is delicate and more liable to be injured by continuous pressure, partly because I fancy the desired effect is obtained in a shorter time than in the case of adults. I have no proof of this theory, but it is supported by the fact that, of the cases I have treated, the children have done at least as well as, if not better than, the adults.

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[1] *Beitrage zur klinischen Chirurgie,*" 1898, 20 Bd., 3 Heft, p. 803.

[2] *Münchner med. Wochenschrift*, 1903, No. 22, p. 938.

[3] *Die Tuberculose der menschlichen Gelenke, sowie der Brustwand und des Schädels*, published by August Hirschwald, Berlin, 1906, and reviewed in the *British Medical Journal*, February 9, 1907, p. 321.

But if the treatment is only for half an hour, it is even then never to be continuous. Bier's rule[1] of alternating negative pressure for five minutes with normal pressure for three minutes I have followed more or less closely. The degree of negative pressure I employ varies in different cases, but is generally equivalent to a column of mercury 1½ inches in height. Sometimes, however, a negative pressure of 1 inch, or of 2 inches is ordered.

Dr. Klapp, of Bonn, has had a wider experience of this instrument than any other man, and he reports a number of good results obtained by its use. In this country the suction apparatus has been employed at the Western Dispensary, Glasgow, and is recommended by Dr. Alexander MacLennan.[2]

By one or other or both of these methods of congestion, I have now treated 11 cases of tubercle. So small a number does not afford a basis for reliable statistics. Moreover, in tuberculosis, where a cure may occur with no treatment at all, the results of any special treatment may be gauged by close observation of each individual case far better than by piling up statistics. It is with this idea that I shall quote certain of these cases. Another difficulty in the way of proving the benefit of this form of treatment is the fact that it is not justifiable to restrict the patient to one treatment only, but, for the sake of the patient, it is essential to employ every available means of combating the disease. For instance, it is often well to administer oil and malt, or a mixture containing iron, or some other tonic, or a stomachic. Moreover, it should be attempted, so far as is possible, to improve the patients' surroundings, and the conditions under which they live, ordering the windows to be kept open, etc., and, of course, it may be argued that the improvement in the patients is due to their improved surroundings.

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[1] *Hyperæmie als Heilmittel*, p. 277.

[2] "The Treatment of Microbic Invasions by Bier's Hyperæmia," THE PRACTITIONER, October, 1907, p. 507.

A close study of the cases has, however, convinced me of the value of treatment by congestion, quite apart from the conditions of life. In support of this view I may quote the case of F. M., 249/07, aged 28. This man, who had tuberculous tenosynovitis of both wrists, showed steady functional improvement for three months in the joint treated by congestion, while the other hand steadily grew worse, in spite of the fact that he was at the same time attending the opsonic department. When congestion was afterwards commenced for the second wrist, it also improved.

Again, J. B., 861/07, aged 11 (a case of tuberculous arthritis and dactylitis affecting the first left metatarso-phalangeal joint, and the two adjacent bones, with a discharging sinus), improved steadily from the time that treatment by congestion was commenced, no other treatment of any kind being given; in fact, the patient was allowed to use her foot and to walk about, which she had not been doing for a month previously. The disease had been in progress for 13 months when the patient first came to me. After a month's treatment by congestion, the sinus had closed, the temperature was normal, and the patient was walking about and skipping without any pain. Again, J. W., 61/06, aged 5, is a striking proof of the value of congestion. Tuberculous dactylitis of the foot had been in progress for 18 months, and had been treated by immobilisation for five and a half months; oil and malt had been given for nearly four months. When first seen by me there were two discharging sinuses, and the surrounding tissues were inflamed and œdematous. Immobilisation was stopped, and congestion ordered; the oil and malt was continued. Within five weeks one sinus had closed, and the boy was walking about. Four weeks later the second sinus appeared to have closed; but this broke open again on the boy absenting himself for three weeks.

I have generally followed Bier's advice, and have not immobilised the part. Hence, patients with dactylitis of the foot have been allowed to walk about freely so long as this caused them no pain. I sometimes apply a bandage over a thick padding of wool. This I do, partly that the dressing may protect from direct injury, partly that it may act as a physical and mental deterrent, when the patient is likely to subject the joint to undue strain.

I am not altogether convinced, however, as to the advisability of allowing freedom of movement in all cases. For on one occasion I had to revert to immobilisation, the joint (an elbow) having become more painful, red, and swollen after movement had been allowed. The patient was a small child, and, although I could obtain no history which would explain the relapse, it is possible that some injury had occurred, whether direct, or due to excessive muscular strain, matters little. This is the only case in which I have reason to believe that movements did harm. Occasionally, for a short time after congestion, without any increase of local symptoms, the temperature rises a little, and the patient does not feel so well. If congestion causes "auto-inoculation," this is just what we should expect to happen. This phase passes off, and the patient then generally feels better than he did before congestion.

Contra-indications[1] to conservative treatment by congestion are :—

(1) Commencing amyloid disease, and advanced phthisis.
(2) Large abscesses, filling the whole joint cavity, and demanding operation.
(3) Faulty position of the joint, such that cure would give a result less useful than that obtained by resection.

Bier also says that if congestion causes the part to become colder, and to appear white and shiny, *i.e.*, if "White Stasis" occurs, either congestion has been wrongly produced, or the case is not suitable for this treatment.

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[1] Bier : *Hyperæmie als Heilmittel*, p. 262.

(*To be continued.*)

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GASTRIC ULCER.

By LOUIS H. L. MACKENZIE, M.B., B.C., M.R.C.S.

THE scientific treatment of a disease is directed not only towards the relief of the symptoms, which have brought the patient to the physician, but also against the cause which has produced them. Unfortunately we are still prevented, at times, from carrying out this ideal treatment by the obscure ætiology of some diseases, and to this class belongs the condition known as simple gastric ulcer. It is probable that the symptoms of the malady are rather the manifestation of certain abnormal conditions affecting the patient than the result of a definite and specific disease. Indeed, certain pathological conditions are sufficiently frequently associated with ulcer of the stomach as to have led to one or other of them being pointed to as the prime factor in its production. Since treatment is to a large extent guided by a consideration of one or more of these, it is necessary, without going at length into the various theories of the causation of ulcer, to take some notice of them here.

It is apparent from its position that the occurrence of gastric ulcer is dependent in some way for its origin, or continuance, on the presence of the gastric juice. This is borne out by the observation of the appearance in some cases of a similar ulceration in the small intestine after the performance of the operation of gastro-enterostomy. Obviously, however, a normal secretion of this fluid in a healthy individual does not produce ulceration, hence it has been asserted that hyperacidity is responsible for the condition. Hyperacidity of the gastric juice has been said to be present in 60 per cent. of cases of chronic ulcer, whereas, in acute cases, it is much less commonly observed. This would seem to point to the conclusion that the ulceration, or its sequels, is a cause rather than a consequence of the excessive secretion of gastric juice, or the secretion of a gastric juice of excessive acidity. That hyperacidity is likely to supervene in cases the chronicity of which has produced deformity of the stomach wall, *e.g.*, hour-glass contraction, constriction of pylorus, is very probable. The stomach being unable to properly contract, the normal functions of the organ are not completely carried out. Food has to lie a considerably longer time than usual in the stomach, and in an abnormal condition due to the insufficient action of the stomach muscle. Such a condition can well be supposed to cause some modification of the digestive gastric secretion. But hyperacidity does not occur in all cases of gastric ulcer, and certainly ulceration does not always follow in cases of hyperacidity. Therefore, although, in the course of treatment, it is highly desirable to combat the condition, for it is certain that the presence of an acid fluid will so irritate an ulcer as to prejudice its chance of healing, some other factor or factors must also be dealt with before cure can be hoped for.

Another condition often associated with gastric ulcer is anæmia.

Daettwyler (quoted by Riegel in Nothnagel's *Encyclopædia of Medicine*) says that of two ulcers of equal size, which were artificially produced in dogs, one healed in 18 days in a normal animal, whereas in the other animal, which had been rendered anæmic, the lesion was not healed in 31 days. Max Einhorn (*Diseases of the Stomach*) quotes the investigations of Griffin and Vassall, which show that in animals, in which parts of the mucous membrane of the stomach are cut or injured with caustic or chemicals, the lesions quickly heal. From this it is argued that, in the production of gastric ulcer, there must be not only a lesion of the mucosa, but also some anomalous condition of the blood. Flutterer (quoted by Riegel) believed that the resistance to healing, observed in gastric ulcer, was largely due to a decrease in the hæmoglobin of the blood.

Turck (*Brit. Med. Journ.*, April 20, 1907) found that the percentage of hæmoglobin did not change materially during the feeding experiments (which I shall describe later) of most of the dogs. In the case of two, however, the percentage dropped to 70. The number of red blood corpuscles remained about the same. Rutimeyer (*Brit. Med. Journ.*, March 2, 1907) found the hæmoglobin reduced in 82 per cent. of his 200 cases.

Dr. William Calwell (*Brit. Med. Journ.*, January 5, 1907) says there are apparently two kinds of ulcer, one a type which occurs pretty frequently in both male and female, and is not often seen until after 20, and the other, connected in some mysterious way with chlorosis and frequently with amenorrhœa, probably a developmental disease. At the end of his article, he gives a chart of 314 cases of chlorosis, and 200 cases of gastric ulcer which almost exactly correspond as regards age incidence.

Max Einhorn (*Diseases of the Stomach*) says that those conditions, in which gastric ulcer is very frequently found—chlorosis, anæmia, amenorrhœa—are also associated with a hyperacid gastric juice.

The fact that the ulcer is, in by far the majority of cases, located near the pylorus is also of importance. The stomach can be divided into two well-defined portions differing from each other in appearance and function. Starling ("Physiology of Digestion," Lecture IV.) says, "The cardiac end and fundus represent a sort of reservoir which is distended by, and slowly contracts upon the mass of food, driving all its fluid portion towards the pyloric end. In the pyloric fifth of the stomach there is a continual series of waves of contraction, which pass towards the pylorus, and provide for the thorough mixture of the food and gastric juice, and finally drive it into the duodenum." As regards the position of the ulcer also "the sharp angle in the lesser curvature, which corresponds with the junction of the flaccid cardiac and tonically contracted pyloric segments, may have some influence in determining the occurrence of ulcers near this part of the lesser curvature" (Box and McAdam Eccles, *Clin. Applied Anat.*, 1906). Also, the pyloric segment lies at a lower level, and offers more resistance to the passage of a substance than the cardiac (*ibid.*).

Nowadays, when bacteriology is coming more and more to the front in the explanation of diseases, and when one has come to look for a specific organism behind every pathological manifestation, it is not strange that in gastric ulcer also, the bacteriologist has attempted to clear away the uncertainty surrounding its ætiology. I have already referred to a paper by Dr. Fenton B. Turck (*Brit. Med. Journ.*, April 20, 1907). By feeding animals with a certain strain of bouillon culture of B. coli for several months, he produced in them peptic ulcers of the stomach and duodenum, and, on leaving off the introduction of B. coli, the ulcers began to heal. No ulcers were found in a large number of controls. Mechanical and chemical irritation failed to produce ulcers. The possibility of systemic disturbances, altered metabolism, and impaired nutrition being ætiologic factors in the production of ulcer led to the experiment of confining animals in very close quarters for a long period of time. Of the 96 guinea-pigs and 36 rabbits used in this experiment, all the rabbits died, while six guinea-pigs survived nine months, and in them two genuine peptic ulcers were found.

Intravenous inoculation of dogs and rabbits with cultures of B. coli for a long period of time (1 to 6 months) failed to produce ulcer of the stomach. But it was found that artificial ulcers, made by removing portions of the mucous membrane of the stomach, did not heal in four cases out of the 20 animals receiving similar inoculation. Genuine induced peptic ulcers were produced, however, in every experiment in which cultures of B. coli were fed to dogs. Dr. Turck draws as conclusions that the factors concerned in the production and persistence of ulcers of the stomach and duodenum appear, from the experiments, to indicate a dual condition: there seems to be some toxic condition produced which overcomes natural resistance, resulting in cytolysis, and possibly some chemical substance formed within the alimentary tract which, when absorbed, may neutralise the protective bodies in the blood and tissues, resulting in autocytolysis.

Ulcers appear to be of more common occurrence among the poorer classes than among those more comfortably situated. Probably this is on account of the bad feeding and improper hygiene prevailing in the former section of society. Rutimeyer (see *Brit. Med. Journ.*, March 2, 1907) has attempted to tabulate the geographical distribution of the disease. Riegel and others have paid some attention to the influence of potassium in the diet, and it is possible that the differences of food, in various countries and classes, play some part in the production of ulcer. In patients suffering from gastric ulcer, two conditions are not infrequently found, either separately or associated —bad teeth and constipation. The former implies defective mastication as well as the constant presence of micro-organisms in the mouth, and the latter an unhealthy condition of the alimentary tract favourable to the development of toxic bodies. Since the pyloric part of the stomach performs the mixing and grinding part of gastric digestion, it will in such cases have to deal with masses of food, the size and consistence of which are greater than it is expected by nature to digest. Further, Dreschfeld (Allbutt's *System of Medicine*) says the presence of ulcer at the pyloric end is due to the absence of glands secreting hydrochloric acid, which is antiseptic. Thus the absence of hydrochloric acid will prevent the destruction of toxic bodies which reach it from the intestine or the mouth. The rougher portions of undigested, or semi-digested, food may produce abrasions of the mucous membrane, which, by the constant presence and action of toxins and microbes, become ulcers.

It is, therefore, plain that the condition is a complicated one for the occurrence of which no one of the causes advanced can be said to be alone responsible. Thus, while the various influences, which may be favouring the production of ulcer, must be borne in mind, each case must be considered individually. While treatment is directed towards the healing of the active ulceration, associated conditions, especially anæmia and hyperchlorhydria, must be combated before a successful result can be hoped for.

An unfortunate characteristic of gastric ulcer is its tendency to recurrence. This is doubtless, in many cases, to be explained by the return of patients to their old surroundings and methods of life. One too often sees patients who, when once cured of their pressing symptoms, think that they can return with impunity to the mode of life which has led to their illness. Sometimes this is a matter of necessity, for working men and women must earn their living in the calling for which they have been trained, and their condition cannot always allow of an ideal existence from the point of view of health. Mayo Robson (*Brit. Med. Journ.*, November 17, 1906) says "private patients, amid more favourable surroundings, who can rest longer, and are more willing to bear restrictions of diet over a lengthened period, suffer less from relapse, though probably not less from the dangers of the serious complications—hæmorrhage and perforation—occurring in acute ulcer." Not seldom, however, this relapse is due to carelessness and ignorance from which the more comfortably situated classes are not exempt.

Of 78 consecutive cases of simple gastric ulcer, treated medically at St. Thomas's Hospital, 15 gave a definite history of previous treatment for the same complaint. Further, 21 patients gave a history of gastric trouble which had occurred previously, some acute and others chronic for years. Six gave a history of considerable hæmatemesis on former occasions, and probably sought treatment at the time. If one adds these last to those who had been treated, one has 27 per cent. of the total number suffering from recurrence after treatment. Some of them too had been treated several, even in some cases as many as five, times.

Mayo Robson, at a meeting of the Royal Medical and Surgical Society (*Lancet*, November 8, 1906), drew attention to the careful investigations undertaken by Dr. C. V. Bulstrode at the suggestion of Mr. Mansell-Moullin on 500 cases of ulcer, submitted to medical treatment at the London Hospital, from 1897 to 1902, and also to the more recent observations of Mr. H. G. Paterson and Dr. J. H. Rhodes, at the London Temperance Hospital, on 158 consecutive cases, which went to show that the percentage of real cures in cases of gastric ulcer, after prolonged treatment by diet and rest in hospital, is under 25 per cent.

It must be confessed that existing statistics show but poor results when a sufficient length of time has been allowed to elapse since the termination of treatment. Many of the cases which, in after years, again present symptoms of stomach trouble, are however really suffering from the results of the ulcer rather than from the ulcer itself. When a patient comes to hospital the first consideration is to relieve him of the present symptoms, and this can only be done by securing healing of the ulcer. This process may itself produce deformity of the stomach which will give trouble later on, but such a case, though hardly showing an ideal result, cannot be really called a failure. The aim of treatment was to cure the ulcer, and this has been done. It is in such cases that surgery claims better results. But, as I have stated before, it is my belief that patients themselves are very frequently responsible for a recurrence. Having once proved himself (or, more often in this disease, herself) to be susceptible to the causes producing gastric ulcer, there is no reason why life, under similar conditions, should not bring on a renewal of symptoms. No immunity can be claimed by an individual who has suffered and recovered from this disease. Only in cases such as those occurring in girls the subjects of chlorosis, which has reduced their powers of resistance, and which, whatever may be the share it takes in the production of gastric ulcer, cannot but be prejudicial to health, may it be hoped that, if they can be tided over that period of life when anæmia is specially common, a recurrence will be improbable.

Usually the treatment of an ulcer, wherever it may be situated, will include rest of the affected part and maintenance of the patient's strength by giving a sufficiently liberal diet. It is, however, obvious that when the ulcer occurs in an organ so intimately concerned in the process of digestion as is the stomach, these two indications are likely to act in opposition to each other. Rest is of paramount importance in this disease, and all cases, presenting symptoms of active ulceration, should be kept in bed. This is an important part of the treatment, and should be insisted upon for a sufficient time, which will vary, to some extent at least, with the individual requirements of each case.

Professor Osler (*Principles of Practice and Medicine*) says "treatment should last for three months at least, most of the time the patient being kept in bed." Dr. H. P. Hawkins, at a meeting of the Royal Medical and Surgical Society (*Lancet*, December 8, 1906), said the time usually allowed for consolidation of repair of an ulcer was quite insufficient, and an important preventive step would be its extension to a minimum of six months.

But, in addition to rest of the body in bed, the activity of the stomach itself must be diminished, and many suggestions have been made as to how the antagonism between rest and sufficient feeding is to be overcome. Hutchinson (*Food and the Principles of Dietetics*) says, "Even when the body is in complete repose there is still wear and tear of its substance going on. One finds that during rest the secretion of carbonic acid is much more profoundly influenced than that of nitrogen. The practical result is that, in the diet of repose, the carbohydrates and fats should be relatively more restricted than the proteids. There are, of course, differences of requirements in age and sex."

Hale White (*Lancet*, November 24, 1906) says the chief reason why patients with gastric ulcer are restricted in their diet is a fear of perforation. But there is a large group of cases in which adhesions render perforation almost impossible, and then perforation is rare in patients who have recently brought up blood.

Moynihan gives 21 cases of perforation, and in none of them was there recent hæmatemesis. "Therefore," says Hale White, "if there has been recent hæmorrhage the risk that food by the mouth will lead to perforation is remote, and it may be given carefully, in small quantities, a few days after the cessation of the hæmorrhage."

The effect on the stomach considerably varies according to the food taken, some of the highest nutritive value being among those requiring the least amount of work from the stomach. A modification of diet taken by the mouth will, therefore, in a large number of cases, be capable of sufficiently diminishing gastric activity to allow the ulceration to heal. Only food stuffs of an easily digestible and non-irritating character are given for some time, and later the patient is able to return gradually to a more ordinary diet. Milk has been for long the food mainly employed in such cases, and its value has been proved. Milk plain, peptonised, or mixed with water, soda water, barley water, or beef tea, may be given at first.

Twenty-four out of the 78 cases at St. Thomas's Hospital were treated in this way, and this diet was continued for a week or ten days. Many of the patients who, for weeks before admission, had been unable to take any solid food without pain and vomiting, and in several cases had brought up a considerable quantity of blood shortly before the commencement of treatment, were discharged at the end of a month feeling well, and able to take solid food without any unpleasant effects. In three of the cases, it was found necessary to abandon the attempt to give food by the mouth owing to persistence of pain and sickness, and in one case to hæmorrhage. In this last case food by the mouth was only given for one day, and it is interesting to observe that, after six days of rectal feeding, the patient had a severe hæmorrhage and died.

Riegel (*loc. cit.*) agrees that milk is nourishing and non-irritating. He says that Reichmann has discovered that boiled milk leaves the stomach much more rapidly than unboiled, and that the lumps of casein formed, when boiled milk is digested, are much smaller than those formed writh raw milk. Riegel also quotes Leo and Von Pfungen to say that, by experiment, milk has been found to have certain antacid properties. Flour soup may be added to milk, and the casein is then said to coagulate in smaller flakes and the mixture to be more nutritious than plain milk.

Osler recommends milk gruel or peptonised milk 300 c.c. twice a day, buttermilk, or Leube's beef solution given 200 c.c. twice a day. He says egg albumen, or the white of eight eggs, alternating with Leube's solution may be given. If the stomach is very irritable, he recommends lavage every morning with mildly alkaline water. He thinks ill effects rarely follow the careful use of the stomach tube in gastric ulcer. Bourget (*Les maladies de l'estomac et leur traitement*) says that, in his opinion, the fear of passing a sound into the stomach, in cases of gastric ulcer, is absolutely without foundation, and he has satisfied himself of the truth of this conclusion by the use of the sound in a large series of cases. He says, "A soft sound introduced into a stomach affected with ulceration can in no case cause perforation. Indeed, to bring this about it is necessary for the stomach to be dilated and its walls thinned, whilst, by introducing a sound, the muscular wall is caused to contract, strongly obliterating, so to speak, the ulcerated part. If the muscular coat is itself destroyed at the point of ulceration, the serous coat will have already become adherent to the neighbouring organs, and perforation is no longer possible if contraction of the organ is provoked."

His method of treatment is as follows :—As soon as gastric ulceration has been diagnosed, whether it is deep or superficial, with or without hæmorrhage, a soft sound is introduced and the stomach emptied. By means of a funnel, 100 c.c. of a solution of perchloride of iron, 1 in 1,000, are then introduced. This is removed and the operation repeated with a similar quantity of the iron solution till the liquid comes out clear, which usually happens after four or five washings. "Patients," he says, "easily bear this operation and derive so much benefit from it that they often request a lavage as soon as their pains come on."

It is claimed that this operation stops pain, and that most often at the first lavage. At first there is a slight burning sensation at the seat of the ulceration, but this feeling diminishes little by little, and in some minutes the patient feels quite relieved. The washing is carried out every day, either morning or evening, but it may be done twice in one day if found necessary, and especially if fresh symptoms of hæmatemesis occur.

A single lavage is usually enough for superficial ulceration, and, in four or five days, the desired effect is obtained in the simple round ulcer. Usually 500 to 600 c.c. of this solution are enough to control even the most severe hæmorrhage, but this dose is continued for four or five days.

In certain very rare cases, when he has been unable to use the sound, he has made the patient drink 200 or 300 c.c. of the solution, and then lie on the stomach for 5 to 10 minutes. As regards alimentation, he finds fluid milk takes longer to digest than in a more solid form, and he recommends milk combined with rice, semolina, or tapioca.

A pulp made with milk, well cooked, is in small volume very nourishing, and gives a minimal stimulus to HCl secretion. He considers that an ulcerated stomach never rests, that is to say, the hydrochloropeptic secretion continues so long as the ulceration exists, and he is convinced that this secretion is increased by the introduction of nutritive enemata. Among other substances which may be given, are prepared proteids, such as somatose, which, according to Hutchison, contains 60 to 70 per cent. of building material, of which a teaspoonful is equal to half an ounce of lean meat. If largely used it may cause diarrhœa. Sanatogen and plasmon, another casein preparation, are also often employed. The latter is easily soluble in warm fluids, is devoid of taste, and, according to Hutchison, is absorbed very completely.

The stomach can be spared by giving peptones and albumoses, and Riegel says that Deiters found that Denayer's albumose peptone mixture maintained the nitrogen equilibrium as well as meat. Another article, which he says does not irritate the ulcerated surface, is meat jelly, while white of egg, like casein of milk, seems to possess the power of combining acids and even, according to Von Pfungen, of neutralising them.

Gelatine, which, although not a true substitute for proteid, is a powerful proteid sparer, is, according to Hutchison, very easily digested, and fixes a great deal of acid.

Turck says meat freed of its extractives, by a process of maceration and boiling, is a useful food. The absence of the extractives deprives the harmful intestinal bacteria of the necessary media for development, and hence the toxins which they produce are reduced to a minimum; the maceration and boiling hydrolyze connective tissue into gelatine, and so make it more digestible, and there is therefore less excitement to production of hydrochloric acid in harmful amounts. Meat, he says, treated in this way passes out of the stomach before milk, or any other food, and the diet has a high proteid value as well as being easily digested and assimilated. Craven Moore (THE PRACTITIONER, April 1907) says Senator recommends a diet of gelatine, fat, and sugar. He says that gelatine is easily digested, highly nutritious (saver of proteid), and increases the coagulability of the blood (and hence stops bleeding).

Hutchison (*op. cit.*) says also that gelatine is very easily digestible, and "fixes" a great deal of acid. Although not a true substitute for proteid, it is a very powerful proteid sparer. Fat also, according to Senator, to some extent inhibits the production of hydrochloric acid. Cases admitted to hospital with a history of recent hæmatemesis, are at once placed by him on a diet composed of a decoction of white gelatine with sugar. Fresh butter and cream are also given, and the former may be given in a frozen form and sucked. He calculates that patients thus receive a diet giving double the number of calories yielded by Lenhartz's diet. If no recurrence of hæmorrhage occurs, milk, beaten eggs, and scraped raw meat are added, and the gelatine gradually cut off, but resumed if there is any subsequent hæmorrhage.

Riegel (*loc. cit.*) says "the hyperacidity of the stomach contents hinders the digestion of carbohydrates, which should be therefore given in a form readily absorbed. Solutions of dextrose are particularly good, as they are readily absorbed, and cause less secretion than preparations of amylum. They are contra-indicated in cases with atony as they favour fermentation."

Hutchison says sugar in considerable quantity tends to interfere with digestion, but glucose is much better than ordinary cane sugar in this respect.

Lactose is the least liable to undergo fermentation—a point in favour of a milk diet in stomach troubles (Hutchison). Riegel, however, considers it too laxative. It has been proved experimentally and clinically (Fleischer, Riegel) that egg albumen is a food which binds and neutralises hydrochloric acid, and a diet of this has for long been used in the hyperchlorhydria occurring in nervous disorders. Hutchison (*op. cit.*) says that lightly cooked eggs pass from the stomach sooner than raw eggs, but that the latter do not call out so much gastric juice, and are really less irritating and more bland. In 1900, Lenhartz suggested that gastric ulcer should be treated in this way, being of the opinion that the persistence of the ulcer is due to hyperchlorhydria. A description of his method of treatment appeared in the *Lancet*, in July 1906, and from it I take the following notes. Lenhartz considers that patients do not, or only slowly, improve on a small milk diet, and the high acidity is not usually diminished. After hæmorrhage patients are in an anæmic and poor condition, and the milk diet does not improve it, and may prevent healing of the ulcer. He further maintains that frequent nutrient enemata, by causing peristalsis, may renew the bleeding, and very little nutriment is obtained from them. He considers absolute rest in bed is required for at least four weeks, and all mental excitement is to be avoided. An icebag is almost continually kept on the abdomen for two weeks, and he claims that this measure prevents gaseous distension, promotes contraction of the stomach walls (and thus tends to obviate hæmorrhage), and eases pain. During the first 24 hours of treatment, even when a hæmatemesis has occurred, 200 to 300 c.c. of iced milk are given in spoonfuls, and from two to four beaten eggs. The eggs are beaten up entire with a little sugar, and the cup containing them is placed in a dish containing ice. Sometimes a little wine is added. The milk is increased daily by 100 c.c., and one additional egg is given each day. When a maximum of 800 to 1,000 c.c. milk and six to eight eggs has been reached, this quantity is continued for a week. No more than 1 litre of milk is at any time given in the 24 hours. Besides milk and eggs, raw chopped meat is given from fourth to eighth day, usually on the sixth—35 grammes per day in small divided doses either with the eggs or alone. Next day, 70 grammes are given, and, later, perhaps, more if it is well digested. This and soft biscuits can now be taken, and in the third week quite a mixed diet is tolerated. Heavy foods and vegetables with husks are forbidden, and the patient must masticate well. The bowels are not to be moved at first, in order to prevent peristalsis, and to promote absorption of blood in the bowels. After the second week, an action is obtained by small injections of glycerine or warm water, and, after the third week, this is done every day if the bowels are not open spontaneously.

This treatment has been carried out in all gastric ulcer cases at the Eppendorfer Krankenhaus, Hamburg, for five or six years. Before this, 20 per cent of cases showed a recurrence of hæmorrhage, but, under the new regime, 135 cases, with one or more hæmorrhages just before admission, had recurrence in only 8 per cent. There were three deaths. In one there was severe anæmia; in the second, there was femoral thrombosis and pulmonary embolism, death occurring on the fifteenth day of treatment, and, in the third, there were five ulcers, and one eroded duodenal ulcer. Most patients are dismissed cured before the eighth week, and, in no case, were any unfavourable effects observed.

Ewald (*Zentralblatt für die Gesamte Therapie*, September 1906) thinks this method of treatment an excellent one in acute cases with recent bleeding, but considers it wiser not to begin mouth feeding at once. Rest in bed he would maintain for two to four weeks. His results in 60 cases were good. "Pain immediately disappears, and patients recover more quickly than with the old diet." Von Wirsing, he says with 42 cases bears this out, and finds, after careful investigation, that patients with recent bleeding under this regime feel better and more comfortable than they used to do. Ewald thinks that, in older cases, any food given by the mouth is liable to displace any clot which has formed at the site of bleeding. In favour of the Lenhartz diet is the fact that gastric ulcer usually occurs in anæmic individuals. "The quicker one strengthens such the better for the patient and for the chance of healing. But I have elsewhere laid stress on the point that early sub-nutrition, as it is employed by means of nutrient enemata, can be very quickly compensated for by further nourishment, as soon as the first danger is overcome, and the irritability of the ulcerated spot has been abolished. But that bleeding can be restarted even with so bland a diet I have many cases to prove."

Dr. E. I. Spriggs (*Lancet*, November 1906) has treated some cases at St. George's Hospital by the Lenhartz method. All of them had suffered from hæmorrhage, and some had been unsuccessfully treated by the usual method. He had no untoward results, and he had seen enough to show him that the patients lose their pain sooner, are more satisfied, gain weight, and are discharged in a much healthier condition and in a shorter time than in cases treated with nutrient enemata and graduated milk diet. Dr. J. A. Lindsay (*Lancet*, January 18, 1907) says that, in view of German advocacy, he has allowed whipped egg, animal jellies, butter and cream from early stages, and he has not seen a case in which such liberty led to michief.

I have seen one or two patients treated in this way at St. Thomas's Hospital, and they did well. They appeared, however, to dislike the diet, and, occasionally, although they had no pain or vomiting, complained of nausea after taking the egg mixture.

It is thus plain that a patient can be kept in a sufficiently well-nourished condition by means of such bland foods as I have mentioned, and there is plenty of good evidence to prove that often a patient can be restored to health by the administration, for a considerable time, of this diet. It has been objected, and in many instances it is undoubtedly the case, that even with non-irritating diet the patient runs the risk of dangerous accidents, and still oftener the ulcer refuses to heal while mouth feeding is continued. Recourse can in these cases be had to rectal feeding. Dr. Sharkey, in his Bradshaw Lecture (*Lancet*, November 10, 1906), has stated the present position of rectal alimentation, and he shows how varied are the views held, and even the results obtained, by investigators of this subject.

Great importance attaches to the kind of foodstuff introduced into the rectum. To begin with, this is due to the fact that no digestion takes place in the large intestine, whereas absorption—at any rate, of certain substances—does occur. Starling (*Physiology of Digestion*) says that the process of absorption in the dog is almost complete at the ileo-colic valve, whereas, in the herbivora, a very large part of the processes of digestion and absorption occurs in the colon and cæcum. Man, he says, takes an intermediate position, as regards his large intestine, between these two groups of animals.

Dr. Sharkey says "there appears to be considerable doubt as to the absorption of albumins introduced into the lower bowel in an unaltered condition, while the evidence of this occurring, even in considerable quantities, in the case of peptones, is very strong." He quotes, in support of this, Voit, Bauer, Armin Huber, and Brandenburg. The peptonising process may be carried out in the intestine itself. Sharkey gives Brown-Sequard's results with injections containing meat and other albumins mixed with preparations of pancreas. In Nothnagel's *Encyclopædia of Medicine* it is also stated that Leube, in 1872, advised the administration of meat pancreas enemata. This had the effect of forming pancreas-peptone in the large intestine—that is, of transferring the digestive process from the small to the large intestine. Sharkey quotes the satisfactory results of these two investigators, as well as those of Mayet and Henninger, and concludes that peptonised nitrogenous food is well absorbed by the large intestine, whether the peptonising is done before the enema is given or in the intestine itself. The latter method certainly involves considerable trouble, but this difficulty can be met by the use of some of the prepared peptones.

Eichorst, Bial, and several others, quoted by Sharkey, are satisfied that peptones and albumoses can take the place of albumins in the nourishment of the body. Hutchison (*op. cit.*) says that, from the results of the investigations of various authorities, peptones are well absorbed. The results obtained with enemata of casein are conflicting. He says that Hoppe found sanatogen absorbed to the extent of fully 77 per cent. With regard to the absorption of fat, Sharkey gives the opinions of various investigators. Boyd and Robertson consider that fat is a very useful ingredient in enemata, but admit that considerable difference of opinion exists as regards its absorption in different cases. They consider it best to give it in the form of yolk of egg. Leube found that the whole of the fat was absorbed if added to a a meat and pancreas injection in no larger proportion than 1 of fat to 6 of meat. Injections of pancreas and fat alone were quickly evacuated, owing to formation of soaps and fatty acids. Others are unanimous in the opinion that fat has no great usefulness in rectal feeding, and that it is only absorbed in small proportions.

"When we come to carbohydrates, we find a favourable opinion as to their absorption almost universal" (Sharkey, *loc. cit.*).

Bial and Leube agree that the solution used should be from 10 to 20 per cent., and the latter says that not more than 300 c.c. should be given at a time, and even then there is a risk of the enema being soon returned (quoted by Hutchison *loc. cit.*).

Boyd and Robertson find pure dextrose the best form in which to administer carbohydrates. Hutchison says that starch, even in a raw state, is fairly well absorbed, although Reach found very little absorbed.

The latter is also inclined to recommend dextrin, as it is as well absorbed as sugar, and less irritating to the mucous membrane. Several investigators have stated that a considerable proportion of starch is converted into sugar by the large intestine. Dr. Sharkey thinks the assertion that sugar, if used in proper strength and quantity, produces glycosuria and bowel irritation is unfounded, and further that only a negligible proportion is split up by micro-organisms in the bowel. He decides that water, salts, sugar, and alcohol are absorbed in abundance; nitrogenous substances, in the form of peptones and pulverised casein, are also well absorbed;

with fat there is uncertainty, but probably very little is absorbed. After criticising the facts and opinions he quotes, he says, "I think we are justified in saying that a considerable amount of nourishment can be introduced into the body by rectal injections."

Voit and Bauer, who appear to have been the first to perform exact experiments with regard to rectal feeding, found that, in dogs, the mucous lining of the rectum and colon was unable to absorb a mixture of egg albumen and cold water, but that it would absorb albumen if it was shaken with a dilute solution of sodium chloride. Eichorst got the same results. Grützner had shown that particles of any material that are injected into the large intestines may, under certain conditions, even reach the stomach. He found that when an emulsion of animal charcoal with 0·6 per cent. of salt solution was injected it reached the stomach, and the large intestine was found empty. If the emulsion was made with distilled water, or HCl, or KCl, the result was negative. Similarly in human beings with starch. Nothnagel considered that stimulation of the serous membrane of the intestine by NaCl may produce antiperistaltic movements of the bowel. In Nothnagel's *Encyclopædia*, from which I quote the foregoing, it is remarked that the effect may be due to the action of the surface epithelium rather than to peristalsis.

Dr. Sharkey (*loc. cit.*) says "several observers assert that the addition of a small quantity of salt to enemata leads to the absorption of albumins which are introduced in an unpeptonised condition into the bowel." He quotes the results of Voit, Bauer, and Eichorst, which I have mentioned, and gives those obtained by Armin Huber. These show that the percentage of nitrogen absorbed from beaten eggs to which salt is added, is almost as much as that from peptonised eggs, both being much in excess of the amount absorbed from beaten eggs unpeptonised, to which no salt was added. Voit and Bauer say that injections of egg albumen and salt produce diarrhœa. Huber thinks that no irritation is caused if not more than 1 gramme of salt per egg is used. Ewald thinks that salt is of no advantage, and Czerny and Latchenberger consider that it hinders absorption. Sharkey considers, in view of these various statements, that salt cannot be relied on to render unpeptonised albumen capable of absorption. He also describes Grützner's experiments above mentioned, which were borne out by the work of Schwiezinski, whereas Dauber, and Christomanos, and Plantenga got negative results. Hutchison thinks that the action of common salt, in promoting the absorption of nutrient enemata, may be due to its stimulating reverse peristalsis, or exciting the intestinal cells to greater absorptive efforts, while it undoubtedly facilitates the diffusion of the enema over the surface of the bowel.

As regards the occurrence of an antiperistalsis Starling (*op. cit.*) says "an antiperistalsis is never observed in the small intestine. The direction of the movement of food will be that of least resistance." He quotes Elliott and Barclay Smith (*Journal of Physiology*, vol. 32, p. 272), who say that a form of antiperistaltic waves occurs in the large intestine, and serves to mix up the food, and even to drive it on. Their observations were carried out on dogs.

Hutchison (*op. cit.*) says "that such a reverse peristalsis is possible is, I think, no longer open to doubt. It is proved by the experiments of Grützner, by the observations of Nencki, Macfadyen, and Sieber on a patient with a fistula at the lower end of the ileum, and by the incontestable fact of the occasional vomiting of enemata by hysterical patients. It is very probable that, in this way, a part at least of a nutrient enema gets carried into the small intestine, when absorption can readily occur. Variations in the patency of the ileo-cæcal valve may explain the different degrees to which different individuals absorb such enemata."

As an objection to rectal feeding, it has been stated that the process stimulates a secretion of gastric juice. If the substance, injected into the large intestine, reaches the small intestine and stomach, whether by means of antiperistalsis or otherwise, a flow of gastric juice appears to be a natural consequence. Riegel (Nothnagel's *Encyclopædia*) says opinion is divided as to whether rectal alimentation increases or diminishes gastric secretion. Following the observations of Winternitz, it was believed that gastric acidity was increased by nutrient enemata, but the studies of Ziarko go to show that the acidity of the gastric juice is really decreased by rectal feeding.

As regards the amount of nourishment, which can be introduced by the rectum and absorbed, and how long this method of sustaining the patient can be maintained, there is difference of opinion. W. Gilman Thompson (*Practical Dietetics*) says, "In an obstinate case of gastric hæmorrhage, in which absolutely nothing, not even water, was given by the mouth for more than a week, I questioned the patient in regard to her sensations of hunger and thirst, and she told me that they were entirely relieved after the first 24 hours' use of nutrient enemata. The mouth and tongue were not dry, and she did not lose weight during this period."

On the other hand, Dr. Hale White (*Lancet*, November 24, 1906) said, "All rectal feeding is starvation diet, and should never be long continued; an ulcer cannot be expected to heal if the sufferer from it is starving." Hutchison maintains that the nourishment of patients by this method cannot be continued indefinitely, and the rectum, sooner or later, becomes intolerant. Dr. Sharkey differentiates between the physiological and experimental aspects of the question. It is probably true that individuals cannot be fully nourished by rectal feeding, but he thinks that in cases, in which the treatment is temporary, complete nutritional equilibrium is not required. In fact, he asserts that, as a reduction of the vigour of the circulation is an important point in aiding healing, a state of subnutrition may be very useful in patients suffering from hæmorrhage. He quotes the experiments of Chittenden and others to prove that a much less quantity of proteid food is required to maintain the body in equilibrium than has usually been supposed. F. B. Boyd, in a paper read before the Edinburgh Medico-Chirurgical Society, 7th July 1906, said the total maximum value of food absorbed from enemata is usually about 500 calories, never more than 600—*i.e.*, about a quarter of that required for equilibrium. Hutchison (*op. cit.*) also gives 500 calories as the daily amount absorbed. Sharkey quotes Voit and Bauer, who said that animals could not be satisfactorily fed by nutrient enemata, at best a quarter of the necessary albumen being absorbed, and Boyd and Robertson, who conclude that, even in the most favourable circumstances, it means distinct subnutrition.

It is obvious that a patient at rest in bed requires less food than does an individual who is doing work. Hale White (*loc. cit.*) says a patient at rest in bed requires at most 2,000 calories, but, from the foregoing statements, it appears that this amount cannot be supplied by rectal feeding.

I have mentioned that several observers believe that nutrient enemata may set up movement in the bowel, and that this, or even the food itself, may reach the stomach. Umber, quoted by Sharkey, found, in a case of gastrostomy, that gastric juice was secreted whenever a nutrient enema was given.

The objections, therefore, to rectal feeding are—

(1) That as a means of nutrition it is inadequate; (2) that there is a danger of disturbing the stomach of the patient by introducing enemata; (3) that irritation of the bowel is sure to occur sooner or later.

Michel quoted by Sharkey, Hutchison, and others have asserted that the benefit derived from rectal injections is due solely to the absorption of water and salts. Donkin (*Lancet*, September 27, 1890), writing on the subject of rectal injections, said he preferred simple fluids to suppositories, peptonised enemata, etc., and raised the question whether only the water is valuable in these injections. He considered it striking that treated and untreated enemata did not differ in result when nothing was being given by the mouth. He, therefore, thought that water alone might justly be tried.

Dr. Sharkey points out that it is well known that animals live a long time if they are supplied with water, although they may receive no food, and suggests a method of treating gastric ulcer on this principle. He quotes Dr. W. S. Pasteur (*Lancet*, May 21, 1904), who advocated a method of dealing with gastric ulcer by means of which he claimed to avoid the difficulty presented by undesirable movement and secretion in the stomach. All cases of gastric ulcer requiring rectal feeding he treated by enemata of plain water at body temperature, "with results sufficiently uniform and satisfactory to be worth recording." He gave 10-oz. enemata at 100° F., and says that, in this way, thirst is prevented altogether in a great majority of cases, and that the unpleasant taste, so frequently complained of by patients, was altogether done away with. He gave the enemata every four or six hours and began with 5 ozs. or 6 ozs., and increased them each time by 1 oz. till 10 ozs. were reached. In most cases, it was possible to supplement the enemata by small quantities of peptonised milk by the mouth before the end of the first week, but, in several instances, the patient had nothing by the mouth for 10 to 14 days, and in one or two cases for nearly three weeks, without complaint or bad symptoms. He says, in his paper, that the treatment is simpler to carry out than ordinary rectal feeding, and its effects are at least as good. In addition, it is pleasanter for the patient, and the daily wash-out necessary in rectal feeding is not necessary.

Dr. Sharkey says, "I tried this method, and have since continued to give only normal saline solution or water per rectum to patients suffering from gastric or duodenal ulcer, at any rate for the first 7 to 10 days. Many patients are quite comfortable under this treatment, suffer but little from hunger or thirst, and their pulse remains steady and satisfactory. In some instances I have continued it for 14 or more days, but I think that it is unwise and generally unnecessary to go on so long." To the question whether it is not better to give some food, even per rectum, than none at all, he finds that—

1. There is much less thirst;
2. The patient is not worried by so many injections;
3. As a rule no nasty taste occurs in the mouth, and it remains much moister and more comfortable;
4. There is not so much craving for food;
5. The nursing of the patients is much more cleanly in every respect.

He concludes, "I believe, therefore, that the injection of normal saline solution or water alone is the best method of rectal alimentation in cases of gastric or duodenal ulcers, at any rate for some days. I generally order three-quarters of a pint four times in the 24 hours, or sometimes a pint. When hæmorrhage has occurred one should be careful not to give more than three-quarters of a pint at a time, as I believe I have seen bleeding return after larger quantities have been used, probably owing to the consequent distension of vessels."

Considerable attention has of late years been paid to the question of the surgical treatment of uncomplicated gastric ulcer.

Mansell-Moullin (*Transactions of the Clinical Society of*

London, vol. 36, p. 79) says, "Ulcer of the stomach is, and always will be, more medical than surgical. But having said this much I cannot help thinking and saying that if a good many of these cases were treated by operation, not only would many more lives be saved, but a vast amount of suffering would be avoided." Mr. H. J. Paterson (*Gastric Surgery*) gives the statistics of 153 consecutive cases of gastric ulcer, not including perforation, pyloric stenosis, or other sequels, treated at the London Temperance Hospital. He arrives at the conclusion that the mortality of gastric ulcer treated medically is at least 20 per cent., and that at least 50 per cent. of so-called cures relapse, whereas operation holds out an almost certain prospect of cure, with relapses of probably not more than 10 per cent. The immediate risk of the operation which he advocates—gastro-jejunostomy—is about 3 per cent., and the remote risk from peptic jejunal ulcer under 2 per cent.

Of 78 consecutive cases of gastric ulcer treated medically at St. Thomas's Hospital (up to July 1907) by various methods, 4 died in hospital, that is, a little over 5 per cent.; but 15 gave a definite history of previous treatment. This is certainly an unsatisfactory state of affairs, although the picture is not so dark as that shown by some statistics. Still the question as to whether surgical interference would have lowered this proportion of recurrences must be carefully considered. Operative treatment has not been in vogue for many years, and it is difficult to be certain of remote results, where medical treatment appears chiefly to fail, until cases have been traced for a considerable time after treatment.

The condition, as Maylard (*A Treatise on the Surgery of the Alimentary Canal*) says, "is one that in most of its aspects essentially requires rest and not interference." But if the ulcer, put in the best circumstances for healing by giving it rest, by diet and medical treatment, still fails to be cured, it seems reasonable to try more active measures. It appears that, in the majority of cases, acute ulcer will be cured by medical treatment. If this has had a fair trial and failed, operative interference is probably desirable. But in the cases, in which the physician has apparently succeeded, is the matter ended? Not always, unfortunately, by any means, for the danger of recurrence is always present.

To operate as a prophylactic measure against recurrence would be rather drastic, but operation is probably indicated even without attempting medical treatment should a second attack occur, and much more so if this is unsuccessfully treated by the physician. Even the most ardent advocates of surgical treatment cannot vouch for the certainty of success, but, if statistics count for anything, there seems to be more hope of lasting recovery in such a procedure.

It has been stated by some (see thesis by Dr. G. Riviere for M.D., Lyons, 1906) that adhesions formed in the healing of an ulcer may produce deformity of the stomach, or give rise to pain—results which would be obviated were the ulcer dealt with surgically. It seems unnecessary, however, to operate merely from fear of such accidents, which are not very frequent, and which, if they do occur, can be remedied later. It is agreed that, even after operation, medical treatment is necessary for a time, and reasonable care should afterwards be given to diet. There is a point which appears to me to have some bearing on the claim that surgery gives more lasting benefit. A patient who has undergone an operation on the stomach will, often perhaps almost unconsciously, treat this organ with greater consideration than before. In consequence of this, he will be less likely to eat indigestible or irritating substances, and any abnormal condition of his alimentary canal, such as constipation, will arouse more of his interest than heretofore, and in consequence receive timely correction. The idea is justified, but it is the condition which has necessitated the operation, rather than the operation itself, which calls for further care, and this is as necessary when the stomach has been treated medically as when it has been a surgical case. This is unfortunately not always realised by the patient.

Mayo Robson (*Royal Med. and Surg. Soc. Brit. Med. Journ.*, November 17, 1906) thinks that at least one-third of all cases treated medically ultimately succumb to the disease, or to one of its many complications, and from ½ to ⅔ of the cases that recover, relapse. From his own experience of 400 operations, often on patients in bad condition, the mortality of the operation is only a little over 3 per cent. This he considers very satisfactory, since "as surgeons we only see the worst cases that have failed to yield to medical treatment, or cases suffering from relapsing or chronic ulcer or complications." He thinks, however, that medical treatment should have a fair trial in both acute and chronic cases.

Paterson (*op. cit.*) says, "Leube says that if a gastric ulcer is not cured by four or five weeks' treatment, it will not be cured by medical treatment alone. Allowing a wider latitude than this: If after six weeks' complete rest on a milk diet, a further period of six weeks on a milk diet with comparative rest, followed by three months' careful dieting, the patient is not free from definite symptoms, or if after apparent cure the patient has a relapse, operation is probably in the best interests of the patient. The symptoms, however, must be clear and definite."

Tuffier (*Chirurgie de l'estomac*) thinks pyloric, juxta-pyloric, or complicated ulcers are most suitable for surgical treatment, and quotes, in support of this, the statistics of Pinatelle.

Bourget (*Les maladies de l'estomac et leur traitement*) considers that operation is only of benefit in cases with pyloric constriction. I had recently an opportunity of asking Dr. Hartmann, associate professor of surgery in the Faculty of Paris, his opinion on this subject. He agrees with those who say that earlier surgical treatment would conduce to better results. In a paper, which he read before the congress of French surgeons in October 1902 (*Medical News*, March 14, 1903), he said, "When taken in time, operation in the benign diseases of the stomach gives very good results. I can prove that very easily by dividing my statistics into two parts. (1) Patients sent to me by physicians well informed on diseases of the stomach, give a mortality of 2·77 per cent. (2) Patients sent by other physicians, generally too late, give a mortality of 26 per cent. This proves most evidently that the mortality in the operations for non-malignant diseases of the stomach depends almost entirely on the physician and the early diagnosis." In the same paper he says, "The acute ulcer, without any complications, is cured by medical treatment when this treatment is sufficiently severe." Although he never operates until medical treatment has had a thorough trial, he has seen cases readily respond to it after gastro-enterostomy, although previous to operation they had been very intractable. Riviere, from whose thesis I have already quoted, says, "It has been asserted that sometimes the painful sensations, however caused, in cases of ulcers when unrelieved by medical treatment, are sufficiently intense in themselves to necessitate surgical interference."

Dr. D. W. McCasky (meeting of American Gastro-enterological Society, *Med. Record*, September 1, 1906) maintained that, in 80 per cent. of all cases of gastric ulcer, surgical treatment was not called for from any point of view. In the remaining 20 per cent. there was a certain proportion in which surgical intervention should be advised. He did not believe that gastric ulcer was any more completely or permanently cured by gastro-enterostomy than by medical treatment. Dr. Murdoch (*ibid.*) thought gastro-enterostomy useless unless there was pyloric stenosis. But Doyen and Talma, independently, came to the conclusion that some form of pyloric stenosis, probably spasmodic, is the chief factor in maintaining hyperacidity, which prevents healing of the ulcer (Paterson), and Hartmann (*loc. cit.*) says, "I think that in pyloric stenosis operative treatment is indicated so soon as the diagnosis is made. I cannot understand the distinctions made by many physicians between nervous strictures and those in which the physician can relieve the painful symptoms for a time by diet."

Rydygier, in 1881, resected a large ulcer from the posterior wall of the stomach, and the patient was cured. The following year Czerny performed a similar operation. Tuffier (*Chirurgie de l'estomac*) considers that resection of the ulcer is the best procedure, if it is possible to do it, and that closure of the ulcer is the next best. Moynihan (Royal Med. and Surg. Society's meeting, November 1906) prefers infolding of the ulcer to excision, and considers one or other of these operations the most satisfactory when it can be done. The same surgeon said (*Transactions of Clinical Society of London*, vol. 37, p. 74) that, in addition to such direct treatment, gastro-enterostomy should also be performed, as other ulcers may be present. He puts the mortality of this operation at 2 per cent. Mayo Robson (*Brit. Med. Journ.*, November 17, 1906) has done nine excisions. Six were well at periods varying from three to eight years later, two had relapsed, and one was not traced. He would reserve direct treatment for certain distinctly circumscribed, or indurated ulcers, and, at the same time, do a posterior gastro-enterostomy, to give rest to, and therefore cure, any other ulcers which may be present. The actual risk of posterior gastro-jejunostomy in his private practice is only 1·7 per cent., and over 90 per cent. of patients are completely relieved. He considers the after-results highly satisfactory; pain vanishes, food can be readily taken and retained, vomiting ceases, and, in a little time, the anæmia improves, and, as a rule, the patient rapidly puts on weight. Feeding can be begun immediately. He advises careful diet and medical treatment for a time after operation to cure hyperchlorhydria. Monprofit (*Traitement chirurgical des affections benignes de l'estomac*) thinks resection combined with gastro-enterostomy an efficient but severe operation. Brenner, he says, did both at one operation in 14 cases and had six deaths, but considered only two of these directly due to the operation. Mansell-Moullin (*Transactions of Medical Society, London*, vol. 29, 97, 2) thinks that excision with gastro-enterostomy should be done when possible. He was only able to do it in five out of 18 cases, being prevented in the others by size, position, or number of the ulcers.

Riviere says Jadlicka has a mortality of only 3·03 per cent. for resection, and Jaboulay had no deaths in eight cases. Hartmann admits the advisability of resecting the ulcer when possible, but usually performs gastro-enterostomy alone, owing to the more serious nature of the former operation. Some of his patients have remained well after gastro-enterostomy performed ten years ago.

Tuffier considers that, by the operation of gastro-enterostomy, the motor function of the stomach is alone improved and stasis prevented, the other morbid processes continuing. Healing of the ulcer is consequently more probable although not certain. He quotes Heydenreich, who gives the mortality of gastric ulcer as 25 to 30 per cent., while that of gastro-enterostomy is 16·2 per cent.; the latter being, therefore, the less of two evils. Tuffier considers that the latter figure can now be put at 5 per cent. Fleiner, he says, recommends it as a prophylactic for hæmorrhage, perforation, or dilatation. Paterson (*Gastric Surgery*) says the best method of treating intractable gastric ulcer is by gastro-jejunostomy. The mortality of the operation is, in skilled hands, probably not more than 3 per cent. The metabolic processes of the body are not interfered with, and the patients may live in perfect health for years ; he compares the operation with that of appendicectomy. Bad results, he considers, are due mainly to mechanical appliances, *e.g.*, Murphy's button, or too small an anastomotic opening. "At the present time," he says, "there is perhaps no more satisfactory operation in surgery than gastro-enterostomy." He gives the results of 107 operations, performed for non-malignant diseases of the stomach, 1882–1901, from Czerny's *Clinik*, analysed by Peterson and Machol :—

Gastro-jejunostomy	- 85	cases,	mortality,	5·8	per cent.
Pyloroplasty -	- 11	„	„	9	„
Resection of pylorus	- 4	„	„	50	„
Excision of ulcer	- 7	„	„	42	„

He thinks results are now better. He believes excision is probably less efficient than gastro-enterostomy, since, although it removes the ulcer, it does not influence the causal factor of ulceration, and the ulcers may be multiple. Gastro-jejunostomy, on the other hand, by diminishing acidity, and possibly by allowing the entrance of small quantities of bile into the stomach, at least removes the condition which prevents healing of the ulcer. He says, too, that recurrence is more frequent after excision than after short circuit.

Mansell-Moullin (*Transactions Med. Soc. of London*, October 29, 9, 72) has had very good results with intestinal short circuit. Four died, he thinks, owing to faulty technique and other preventable causes. The 10 cases uncured were very far advanced before operation. Some time after operation, he finds patients have no discomfort with reasonable care in diet and proper mastication. Hale White (*Clinical Journal*, August 15, 1906) thinks gastro-enterostomy, as a rule, the best operation, and Moynihan (*loc. cit.*) considers posterior gastro-enterostomy with no loop the best indirect method.

Operative treatment can then be divided into direct and indirect, the former meaning resection, or "burying" of the ulcer, the latter being the formation of an artificial opening between the stomach and the intestine.

Resection has the advantage of removing the lesion, and thus preventing hæmorrhage or perforation. It also prevents the disputed but possible cancerous degeneration of old ulcers and their scars. Against the operation is its gravity. The mortality is high, and a patient, in an already serious condition, is not in a state to bear any prolonged and dangerous operation. It is impossible to compare the mortality of the operation with that of the disease, rather should one superadd the one to the other. Not infrequently the patient suffers from multiple ulcers—a fact which can only be discovered at operation—and resection is here out of the question. But one of the chief objections to direct treatment is that, although the actual lesion is ablated, the cause is left to operate as before, and recurrence is quite probable.

In favour of indirect treatment is the simplicity and rapidity of the operation, the mortality of which is low and probably diminishing in consequence of improvement in the methods of operating. Also the stomach is put more or less at rest, and its functional disturbance relieved. Added to this is the undoubted success obtained by many surgeons with this operation. Against gastro-enterostomy is the occasional, and always possible, persistence of the symptoms in spite of it, and the fact that prolonged rest and treatment, under a strict regime, are difficult to carry out in patients of the lower social orders.

The ideal procedure is probably a combination of the two, but whereas, so far as can as yet be seen, the comparatively simple operation of gastro-enterostomy alone often gives good results, it must be remembered that those surgeons who advocate direct, or a combination of direct and indirect, treatment usually add "if possible."

The advantages and disadvantages of resection of the ulcer and of gastro-enterostomy may be tabulated as follows:—

GASTRO-ENTEROSTOMY.

Advantages.

(1) Operation, simple and rapid;
(2) Gives rest to the stomach, at any rate to considerable extent;
(3) Mortality of operation not high, and probably diminishing.

Disadvantages.

(1) Ulcer itself left untouched;
(2) Peptic ulcer of intestine may occur;
(3) Rigorous treatment is afterwards required for some time;
(4) Symptoms may persist;
(5) The artificial opening may become narrowed;
(6) Vicious circle may be formed.

RESECTION OF ULCER.

Advantages.

(1) Lesion itself is ablated;
(2) Prevents hæmorrhage from, or perforation of, ulcer.

Disadvantages.

(1) Gravity of operation;
(2) Ulcer may not be found, or may be in difficult position;
(3) May be multiple ulcers;
(4) Subsequent deformity of stomach;
(5) Functional condition of stomach not affected.

Lastly, I come to the question whether medical treatment is sufficient to control hæmatemesis, and if not what surgical measures are to be taken. Hale White (*Clinical Journal*, August 15, 1906) says hæmatemesis is rarely directly fatal, and frequent recurrence is important rather than the amount of blood lost at one time. Mayo Robson (*Brit. Med. Journ.*, December 17, 1906) thinks medical treatment is generally successful, and moreover the bleeding may be oozing from capillaries, or arterioles, in which case operation would be useless. He says when, with distinct signs of gastric ulcer preceding the hæmorrhage, sudden hæmatemesis occurs with great loss of blood, accompanied by syncope, a large vessel is usually the source. Operation is then advisable if it does not speedily yield to medical treatment. In bleeding from chronic ulcer, whether slight or severe, surgical treatment is demanded, not only for arrest of hæmorrhage, but also for the curative treatment of the ulcer itself. Sir Dyce Duckworth (*Brit. Med. Journ.*, December 1906) thinks that operative treatment for gastric hæmorrhage in young women is in the majority of cases undesirable. Hale White (*Brit. Med. Journ.*, December 1906), in view of a condition, which he had described as gastrostaxis, held the same view.

Hartmann does not think a great hæmorrhage indicates operation, for the operative mortality is high, the cure by medical treatment frequent. On the other hand, small and repeated hæmorrhages require surgical treatment, and Dr. F. J. Smith expressed the same opinion (*Clinical Journal*, November 19, 1902). Maylard (*A Treatise on the Surgery of the Alimentary Tract*) says "fatal hæmorrhage appears to be comparatively rare and possibly in many, if not in most, of these cases death will be unpreventable whatever the means employed." But he says further "it is in some of these severe cases of hæmorrhage that surgery may lend valuable assistance," and he quotes Ewald: "When violent hæmorrhage has once set in, the danger of its recurrence hangs like the sword of Damocles over the head of the patient." In accord with Tocher, Rodman, and Mayo Robson, Tuffier (*op. cit.*) thinks it necessary to operate after the second very abundant hæmorrhage, or even during it, and at latest after the third, especially if the interval diminishes. Dieulafoy, he says, considers operation is required if the hæmatemesis at first and at once reaches ½ to 1 litre of blood, and still more if this is repeated. But Tuffier agrees that treatment has no time in fulminating cases. He considers that hæmorrhage often ceases after, but not on account of, operation, and Riviere (*op. cit.*) quotes various authorities holding the same opinion.

The difference in the clinical picture of hæmatemesis in acute and chronic cases has, says Paterson, an important bearing on the surgical treatment of the bleeding. Fenwick (*Ulcer of the Stomach*) says that severe hæmatemesis, suddenly occurring in an acute case, usually ceases spontaneously and is rarely repeated. In the chronic form hæmatemesis, though less alarming in quantity, is often persistently recurrent. Pathologically, Paterson classifies hæmorrhage from acute ulcer as primary, and from chronic ulcer as secondary, and recommends treatment on the general principles governing the treatment of such conditions. Thus, he says, "In hæmorrhage from an acute ulcer, once the bleeding has ceased, whether spontaneously or by the aid of medical art, we should hesitate to interfere. If, in spite of absolute rest, hæmorrhage starts anew, we may safely conclude that nature has failed, and if the second hæmorrhage has been a severe one surgery must step in." In bleeding from a chronic ulcer, on the other hand, which has been treated, an operation should be performed to prevent recurrence. For probably a repetition of hæmorrhage is due, not to mechanical diplacement of a clot but to septic disintegration. But in this case the amount of bleeding must be taken into account, for every slight hæmorrhage may not call for operation. He considers the risk of operation, if undertaken during a quiescent interval, probably less than the risk from further hæmorrhage.

The early results of gastrotomy for intrastomachic hæmorrhage were so discouraging as to have led to operative treatment being condemned, at any rate, in very acute and fulminating gastrorrhagia. Monprofit (*Traitement chirurgical des affections benignes de l'estomac*) does not think this opinion is now justified. He recommends a search for the bleeding vessel, and ligature *in situ*, or resection of the ulcerated part, which he considers safer. He admits that adhesions and the position of some ulcers make the operation difficult, but thinks it will become less so. As a last resource, he would ligature the mucosa *en masse*, or use the cautery. When the case is not acute one can wait, and he would then do gastro-jejunostomy.

Rydygier and Roux, of Lausanne, who performed the first successful operations for arrest of hæmorrhage, excised the ulcer and ligatured the artery on both sides of the bleeding point. Mikulicz and Korte used the thermocautery apparently without much success.

Mayo Robson has operated on 4 cases of acute hæmorrhage during the continuance of the bleeding, and all recovered and are well. In 2, numerous bleeding points were ligatured *en masse*, and gastro-enterostomy performed ; in 2, he did gastro-enterostomy alone. He says, " As the risk of operation during a quiescent interval is less than if undertaken while bleeding is continuing, it is desirable, if possible, to secure arrest of hæmorrhage even in chronic ulcer before undertaking operation ; but, if the hæmorrhage is persisting, the surgeon is not justified in waiting till the patient is reduced to such a condition that it is too late to operate."

According to Moynihan's observations (*Transactions Clinical Society of London*, Vol. 37, p. 74), the factor determining recurrence of hæmorrhage is distension of the stomach, and he considers that gastro-enterostomy by emptying it will prevent, or go far towards preventing, further bleeding. Mansell-Moullin ligatures *en masse*, or excises the ulcer, as he says there is no certainty that gastro-enterostomy will prevent recurrence of bleeding. Paterson, however, thinks recurrence of hæmorrhage after gastro-enterostomy rare and due to malignant disease, the employment of mechanical appliances or an insufficient anastomotic opening. Tuffier recommends, when possible, resection of the ulcer. Failing this, he closes the ulcer either by ligature *en masse* of the mucosa—a method particularly applicable to superficial ulceration—or by burying the bleeding point in a fold of the mucosa by means of catgut passed below it, or by suture, the edges of the ulcer having been pared away as far as the margin of healthy tissue. The open vessel is of course tied. He thinks that gastro-enterostomy, though not absolutely a radical cure, is frequently efficacious in chronic cases.

The weight of opinion is therefore in favour of operation in cases with repeated hæmorrhage unchecked by persevering medical treatment. Surgeons, differ, however, as to whether interference is called for after one or even two profuse hæmorrhages. Operation during the hæmorrhage is a serious matter, for, as Tuffier says, the danger of the operation has to be added to that of the accident itself. Moreover, it is by no means certain that, having opened the stomach, the surgeon will be able to find the source of bleeding, or check it when found.

As to the operation to be performed, direct treatment alone seems to offer hope in acute cases. But in the more chronic cases gastro-enterostomy may suffice. There is no doubt that it is not an infallible cure for hæmorrhage, and I know one case myself in which severe hæmorrhage from an ulcer persisted for some time after the operation, and several surgeons have reported cases. It is, however, a much simpler operation than excision or other direct treatment, it will give rest to the ulcer, sufficient perhaps to allow it to heal, and, lastly, it has been found by experience in a large number of instances to be efficacious.

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SOME RECENT WORK IN DISEASES OF CHILDREN.

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PNEUMONIA AND PNEUMOCOCCAL INFECTIONS.

MUCH has been written recently on the rôle of the pneumococcus in diseases of children, and it is evident that this micro-organism plays a larger part than was formerly supposed in the diseases of early life. Lobar pneumonia is very much commoner in infancy than has usually been taught —Dr. Frederick Taylor,[1] in the Wightman lecture, quoted Dr. Clive Rivière's figures showing that, out of 155 cases of lobar pneumonia in children up to 4 years of age, 20 occurred in the first year, and 46 in the second. Dr. Melville Dunlop,[2] out of 147 cases in children, up to the age of twelve years, found 12 in the first year, and 33 in the second year, and mentions one case in which lobar pneumonia occurred at the age of three weeks.

Dr. Taylor stated that the records for one year, at Guy's Hospital, showed amongst 28 cases of lobar pneumonia, only one as young as two years of age, and four at three years old.

Dr. Whipham,[3] amongst 65 cases in children under 12 years old, saw 4 in the first year, 12 in the second, and 15 in the third.

Anyone who is familiar with the difficulties of diagnosing between broncho-pneumonia and lobar pneumonia will agree with Dr. Taylor that herein lies the explanation of any discrepancies in figures dealing with the age incidence ; moreover, as he points out, broncho-pneumonia may occur in conjunction with lobar pneumonia, a combination which can hardly be recognised at the bedside, though it may be proved by post-mortem examination.

It is admitted that lobar pneumonia may occur more than once in the same patient, but it must be very rarely that it occurs nine times, as in the case of a little boy, who came under the care of Dr. John Allan,[4] with his ninth attack at the age of twelve years.

Dr. Huber[5] records a case, in which there was right apical pneumonia in an infant, aged seventeen months; the temperature, on three successive days, was 107° or higher, and was markedly intermittent, reaching the normal, or almost the normal, daily. The child made a good recovery, the temperature fell by lysis. In this case there were no cerebral symptoms beyond restlessness; but often, especially with apical pneumonia in young children, there are symptoms very closely resembling meningitis, which nevertheless pass off leaving the child no worse. Dr. Wise[6] noted that extreme contraction of the pupils, with subsequent unilateral dilatation, and sometimes dilatation of both pupils, seemed to be of very grave significance; the cases in which these symptoms occurred ended fatally. He very rightly points out the necessity for caution in diagnosing suppurative meningitis as a complication of the pneumonia. It is by no means a rare cause of death in infants with lobar pneumonia and empyema, but often the symptoms, which suggest it, prove to be nothing more than those due to toxæmia or hyperæmia of the brain. But what is the explanation of these delusive cerebral symptoms? Dr. Wise thinks that it is very doubtful whether, in some cases, they can be due to toxæmia, for he says, that when the administration of a suitable hypnotic has produced sound sleep for some hours, the cerebral symptoms sometimes pass off rapidly. He expresses the view that "cerebral disturbance, in some cases of pneumonia, is aggravated by the senseless administration of large doses of strychnia," and says that he has seen several cases, in which the discontinuance of the strychnia, and the administration of an opiate were followed by the most happy results.

Dr. J. D. Rolleston[7] draws attention to the occurrence of lobar pneumonia in children with diphtheria. As a rule, of course, the pneumonia of diphtheria is a lobular pneumonia. Amongst 1,000 cases of diphtheria, of whom 266 were over the age of seven years, there were seven cases of lobar pneumonia, all in children under the age of seven years; all except one began within the first ten days of the disease. It is noteworthy that only in one of these cases did the pneumonia end by crisis. Dr. Rolleston points out the great difference in prognosis between lobar and lobular pneumonia as a complication of diphtheria; not one of the lobar cases died, whereas 80 per cent. of cases of broncho-pneumonia proved fatal.

Apart from diphtheria, there can be no doubt that the outlook is very much graver in the child with broncho-pneumonia than in the child with lobar. Dr. Whipham found, in the former, a mortality of 45·9 per cent., in the latter, a mortality of 16·9 per cent.; while Dr. Melville Dunlop mentions in broncho-pneumonia, a mortality of 25·1 per cent., in lobar of 10·2 per cent.

Dr. Packard,[8] emphasising the value of stimulants in the treatment of lobar pneumonia in children, recommends half a grain of camphor in half a drachm of sweet almond oil every three or four hours. Strophanthus also, he considers, valuable in these cases. The temperature of the room, in which a child with pneumonia is to be nursed, is a matter of some difference of opinion. In a recent discussion,[9] one physician was in favour of 50° to 60° F. while another thought it should be 70° F., probably, as usual, safety lies in the middle path, and perhaps 60°—65° may be considered as most suitable; certainly as one physician remarked, since "the abandoning of the coddling treatment, the pendulum has swung too far in the opposite direction"; it is undesirable to leave young babies in the cold air. Dr. Taylor, referring to "ventilation" in the treatment of children's pneumonia—and by ventilation, he says, is meant open windows and free exposure of the patient to the air in any way, in contrast to the "tenting" and steam-kettles of former days—expresses the opinion that extensive trial of such methods is necessary to demonstrate that they give any better result than the older procedure.

EMPYEMA AND SUPPURATIVE PERICARDITIS.

Amongst the many results of pneumococcal infection, none is more common, as a sequel of pneumonia, than empyema. As Dr. Dunlop (*loc. cit.*) points out, empyema should always be suspected when the temperature rises again after the crisis of a pneumonia. Sir Watson Cheyne,[10] states that, in children, more than 60 per cent. of empyemata are due to the pneumococcus, whereas, in adults, only 25 per cent. of empyemata are pneumococcal.

There is evidently a special liability in childhood to pneumococcus infection in the pleura, but not only here; in other parts of the body also, the child seems to have a feebler capacity for resisting the pneumococcus than has the adult. Sir Watson Cheyne points out that, while pneumococcal peritonitis occurs at all ages, it is much more frequent in children, being most common between three and ten years of age; similarly pneumococcal disease of joints occurs chiefly in childhood, and general pneumococcal infection, constituting a regular pneumococcal septicæmia, is most common in infancy.

One of the most disastrous of pneumococcal infections is suppurative pericarditis. Dr. F. J. Poynton[11] found that 83 per cent. occurred before the end of the fourth year, and two-thirds of the cases between the ages of one and three years. In about 60 per cent. of the cases of this affection, there is with it also empyema, and, in about 40 per cent., there is either pneumonia or acute pleurisy; moreover, in 15 per cent., there is suppurative meningitis, and, in 8 per cent., suppurative peritonitis. There are few diseases of the heart more difficult of recognition than pyopericardium. As Dr. Coutts[12] mentions, there is seldom any pericardial friction. In an infant, aged 20 months, he diagnosed the condition from the extension of pericardial dulness, diminution of the cardiac sounds, and evidence of cardiac distress with fever and a high leucocyte count; by operation, 1—2 ounces of pus were evacuated, but the child died two days later. In several cases under his care, the diagnosis was made correctly, but operation did not save life.

Occasionally, pyopericardium simulates empyema. Dr. B. Adams reports a case, in which the signs were those of an empyema filling the left pleura, which was aspirated; 28 ozs. of pus were withdrawn from the pleural cavity, as was supposed, but on resecting a rib no pus came from the pleura, and the child quickly died. It was found that the pericardium had been distended so greatly as to extend up to the clavicle, while the left lung was completely collapsed. In this case, the pus was staphylococcal. But with pneumococcal infection, as the present writer has pointed out,[13] there is usually no great quantity of fluid in the pericardium. Amongst 28 cases, none showed more than 5 ozs., and most showed only 1 to 1½ ozs. of pus; so that no great extension of cardiac dulness must be expected. Probably, quite as much stress is to be laid on symptoms as on signs in the diagnosis of this disease. Dr. Poynton considers orthopnœa and syncopal attacks, with a rapid and excited pulse, as most suggestive in a child who has had pneumonia or empyema recently. He mentions also extreme illness with lividity, panting respiration, and excessive dyspnœa and irregular rises of temperature, accompanied by rapid and feeble action of the heart.

Even though operation has failed to save life in the large majority of cases, there is no need to despair of this condition. Mr. C. N. Gwynne,[14] of Sheffield, recently reported the case of a child, aged 7 years, in whom 10 ozs. of pus was evacuated from the pericardium with complete recovery, but in this case the pericarditis was presumably not of pneumococcal origin, for it was associated with osteomyelitis. Such a case, however, confirms the good hope, raised by some other records, that pneumococcal pericarditis also is amenable to operative treatment.

Pneumococcal Peritonitis.—With pericarditis, as I have already mentioned, there is sometimes associated a pneumococcal infection of the peritoneum, but, in these cases, the recognition of the peritoneal disease is probably hardly ever possible. The heart affection overshadows the abdominal. It is in the cases of primary pneumococcal peritonitis, that the diagnosis becomes of great practical importance, for, in these, operation may save life. Mr. H. S. Clogg[15] quotes figures, showing that, out of 58 cases of this form of peritonitis in children, only 7 were a complication of pneumonia. Girls are affected much more often than boys; 7 boys and 51 girls was the record of one observer; 6 boys to 38 girls the record of another. The peritonitis is sometimes localised and encysted, usually on the right side, and therefore very difficult to distinguish from appendicitis. Mr. Clogg states that the cardinal points in the diagnosis of the encysted pneumococcal peritonitis, are, the sudden onset, with abdominal pain, vomiting, fever, and diarrhœa, amelioration of symptoms, persistence of the diarrhœa, and later a hypogastric (usually) swelling. He considers the diarrhœa as specially pointing to this disease rather than to appendicitis, but one may doubt whether any great stress can be laid upon this distinction for, as he himself points out, diarrhœa is sometimes a feature of appendicitis. Much the same symptoms, but without the localised swelling, and with more general distension, are seen in the diffuse variety. Recently Mr. Clogg[16] has reported a case, in which, with diffuse pneumococcal peritonitis, there was also a large sub-diaphragmatic abscess, presumably due to similar infection.

Amongst other affections due to the pneumococcus, arthritis has attracted attention in recent years. Mr. A. H. Tubby has recorded one, possibly of this nature, in an infant, aged 14 weeks. As a rule, it is a complication of pneumonia and empyema.

The pneumococcus has been frequently found in middle ear disease, and otitis media is a common complication of pneumonia. No doubt, as Kopetzky[17] says, the invasion is from the throat, *viâ* the Eustachian tube. As a rule, however, there is nothing visible in the throat to suggest the presence of the pneumococcus there; such a case as that recorded by Dr. W. Pasteur,[18] in which an acute pharyngitis in a child, aged 3½ years, seemed to be due to pneumococcal infection, must be exceptional.

RHEUMATISM IN CHILDHOOD.

Another common infection in children is rheumatism, if one may conclude, from the careful observations of Dr. Poynton and others, that there is no longer any doubt that rheumatism is due to a specific micro-organism. Still, it must be admitted there is as yet no unanimity on this point. Dr. Longcope, at the Philadelphia Pediatric Society, reviewing some of the bacteriological investigations on rheumatism, said, *à propos* oi the diplococci, which have been described as the cause of the disease, that at the present time there seemed to be no convincing proof that these diplococci are specific bacteria, or the cause of a specific disease—rheumatic fever. Dr. McCarthy, at the same meeting, expressed the view that, until acute articular rheumatism is definitely linked as an acute specific infection with a definite and distinct bacterial cause, it is not only unscientific but useless to consider every case of chorea and every case of endocarditis, pericarditis, or myocarditis as rheumatic. Probably there is little danger that anybody would suppose all these forms of heart disease to be necessarily rheumatic. It is quite certain on sound bacteriological evidence that they are not, but one may suspect that the larger a physician's experience, the more closely will he approach the position of those who hold that chorea is cerebral rheumatism, a conclusion to which the investigations of Poynton and Holmes certainly seem to point.

The rarity of hyperpyrexia, in the rheumatism of childhood, gives a special interest to two cases which have recently been recorded, the one in a girl, by Dr. Lock,[19] aged 6 years, with chorea and joint-rheumatism, whose temperature rose to 110° just before death, the other by Dr. George Carpenter,[20] in a girl, aged 3½ years, whose temperature rose to 106·4° with chorea rheumatic nodules and endocarditis. Dr. Poynton has also published a case in a child, aged 11 years; but in this instance, unlike the other two, there was a gross lesion of the brain and cord, namely, meningitis, found at post-mortem examination.

Rarer even than hyperpyrexia in the rheumatism of childhood, is the occurrence of any rheumatic manifestation in infancy. Reports of such an occurrence must be received with the greatest caution. A perusal of the records of some of them does not tend to convince one of the correctness of the diagnosis. It must be remembered that infants are subject to several forms of arthritis, other than rheumatic, and some of these subside without suppuration. Dr. Crozer Griffith,[21] whose experience adds weight to his report, describes the case of an infant, aged 8 months, who had fever with swelling and tenderness of joints; the symptoms subsided under the use of oil of gaultheria externally, and sodium salicylate internally. There was some relapse, and eventually slow recovery. There was, however, no heart affection.

Dr. Crozer Griffith recommends ichthyol, or oil of gaultheria, as local applications for the arthritis of rheumatism. He finds gentle compression of the joints useful in some cases, and considers that Bier's method is worthy of trial.

For the heart lesions, he regards blistering as unsuitable in childhood. Salicylates, he says, have not been proved to have any definite curative effect, but they undoubtedly relieve the joint pains; salipyrin, salophen, and aspirin, are not, as a rule, to be preferred to the ordinary salicylates. He does not think that salicylic acid preparations have any influence in preventing cardiac involvement. Some evidence has been advanced that alkalies prevent the development of cardiac complications, and, if the urine is decidedly acid, alkalies should be given.

INFANTILE PARALYSIS.

In the summer and autumn of 1907 an epidemic of infantile paralysis prevailed in New York and its vicinity; several hundreds of cases were reported.[22] In many cases in this epidemic pain and tenderness were prominent symptoms, requiring opium for their relief. There were also many cases in which indications of bulbar irritation, difficult deglutition, irregular heart action, and laboured respiration were present, while in others rigidity of the neck, occipital headache, and irregular pupils, suggested cerebro-spinal meningitis. Dr. Ager,[22] drawing attention to these features, raises the question whether there was in every case a lesion of the anterior horns, or whether some may not have been suffering from acute encephalitis, or multiple neuritis, or a transverse myelitis. In several previous epidemics there has been this diversity of symptoms, raising a doubt whether the epidemic disease was really identical with the sporadic disease which is so common, and which we regard as usually an anterior poliomyelitis. A valuable study of 35 epidemics has recently been published by Holt and Bartlett,[23] who pointed out that this seasonal incidence is remarkably uniform, 31 out of the 33 epidemics occurred in the hot season only. An epidemic is found not to be followed by any unusual number of sporadic cases in the following years. In the large majority of cases the children attacked had been in good health until this illness occurred. The mortality, in 1,659 cases, in various epidemics, was 12·1 per cent., and the writers point out that the discrepancy between this and the generally-believed low mortality of the sporadic disease is explained by the fact that cases with bulbar symptoms, which make up most of the fatal cases in epidemics, have not been recognised as poliomyelitis when they occurred in scattered instances.

In the epidemics, the disease has mostly attacked children under four years of age, but it seems that the epidemic form tends to attack a somewhat larger proportion of older children and adults than the sporadic. One of the many important points, investigated by these writers, is the contagiousness or infectiousness of the disease. They have collected 40 instances of more than one case occurring in a family or household, in 31 instances 2 cases in a family, in 5 instances 3 cases in a family, in 3 instances 4 cases in a family, in 1 instance, 7 cases in a family. They have recorded the intervals between the occurrence of the disease in the various members of the family in several instances, and the conclusion they arrived at is this: "The occurrence of epidemics and the relation of certain groups of cases to one another, in these epidemics, place beyond question the statement that acute poliomyelitis is an infectious disease. Whether we can go further, and state that the disease is communicable is an open question. After carefully considering all the evidence brought together in this paper, we cannot resist the conclusion that the disease is communicable, although only to a very slight degree, one of the most striking facts being the development of the second cases within ten days after possible exposure. Positive statements, however, must be deferred, until the discovery of the infectious agent."

[1] *Brit. Journ., Childr. Dis.*, June 1907, p. 256.
[2] *Brit. Med. Journ.*, August 15, 1908.
[3] *Brit. Journ., Childr. Dis.*, July 1908, p. 275.
[4] *Ibid.*, April 1906, p. 147.
[5] *Arch. Pediatr.*, April 1907, p. 295.
[6] *Pediatr.*, October, 1907, p. 625.
[7] *Brit. Journ., Childr. Dis.*, December 1906, p. 536.
[8] *Pediatr.*, April 1908, p. 257.
[9] *Ibid.*, p. 258.
[10] *Brit. Journ., Childr. Dis.*, August 1908, p. 328.
[11] *Brit. Med. Journ.*, August 15, 1908.
[12] *Ibid.*, April 15, 1908.
[13] *Brit. Med. Journ.*, September 7, 1901.
[14] *Trans. Soc. Study.*, *Dis. Childr.*, V., 269.
[15] *Brit. Journ., Childr. Dis.*, November 1906.
[16] *Ibid.*, July, 1908.
[17] *Pediatrics*, October, 1907.
[18] *Lancet*, May 27, 1905.
[19] *Brit. Journ., Childr. Dis.*, December 1907, p. 530.
[20] *Lancet*, November 30, 1907.
[21] *Archives Pediatr.*, April 1908, p. 265.
[22] *Archives Pediatr.*, *Edit.*, October, 1907.
[23] *Amer. Journ. Med. Sci.*, May, 1908.

THE STOMACH.

A REVIEW OF SOME RECENT WORK.

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FORM AND POSITION OF THE STOMACH.

THE normal stomach form has, during recent years, been the subject of numerous investigations, by which it has been conclusively shown that the classical descriptions, based on the flaccid post-mortem viscus, are anatomically inexact, and physiologically misleading.

The investigation of the stomach in the formalin-preserved cadaver [His, Cunningham, Froriep], the rapid fixation of the living stomach in various phases of digestion [Sick], and the application of the Roentgen rays to the investigation of the stomach in animals and human beings [Cannon, Rieder, etc.] have all shown that an adequate conception of the stomach form must be based on the fundamental fact that the stomach is an active muscular organ, which, during life, is continually adapting itself to the varying physiological needs of its contents, and, even after death, may, under certain conditions, bear the stamp of the particular phase of its muscular activity in which death overtook it.

The stomach form is no mere passive anatomical quality, but the expression of an active physiological state, varying with the degree of fulness, with the phase of the digestive process, and with the intensity of the contraction of its muscular walls; while its position, influenced also by these factors, is further modified by variations in its environment (the stomach bed), in particular by the condition of the intestines and of the anterior abdominal wall. It is futile to designate any form or position of the stomach as normal where so many are normal. "Beständig-ist nur der Wechsel" as Froriep remarks. Nevertheless the stomach presents certain features which, by their permanency, afford useful descriptive landmarks, and, as some degree of confusion is arising from a multiplicity and varied application of terms, it is important to establish a clear conception of the topography of the stomach, as has been done by Cunningham.

The intra-abdominal portion of the œsophagus (antrum cardiacum), expanding like an inverted funnel, joins with the stomach at the upper part of the lesser curvature. On the left side it is generally marked off from the fundus by a groove, the incisura cardiaca; whereas, on the right, it becomes confluent with the lesser curvature. By an imaginary horizontal plane (zona cardiaca), passing through the cardiac opening and a point on the greater curvature directly opposite, the fundus is demarkated from the body of the stomach; whilst by an angular depression (incisura angularis) on the lesser curvature, produced by an elbowlike bend in the organ at that point, the body of the stomach is demarkated from the pyloric portion; the latter is subdivided into the pyloric vestibule, a bulging of the greater curvature opposite the incisura angularis, and the pyloric canal, a short more or less tubular portion extending from the groove (sulcus intermedius) on the greater curvature, delimiting the bulging of the vestibule to the duodeno-pyloric constriction.

The position and appearance of the empty contracted stomach, as determined by His and Cunningham, are as follows:—

The terminal portion of the œsophagus takes a sharp turn to the left; the organ is bent on itself like a sickle, and the fundus sinks downwards so that it comes to look directly backwards; the surfaces look upwards and downwards, the curvatures forwards and backwards—the greater curvature being at a slightly higher level than the lesser curvature. The upper surface slopes gradually downwards from the fundus to the duodeno-pyloric constriction, a result, as Cunningham pointed out, of the stomach being pressed up by the intestines and abdominal wall against the sloping under surface of the liver.

In the full stomach, the fundus rises upwards, and in general form, the organ becomes rounded; it assumes an oblique position so that its surfaces look backwards and forwards; the pyloric part ascends to its termination, and that part of the greater curvature, formed by the pyloric vestibule, takes a mesial position, and occupies a lower level than any other part of the stomach. This vertical position of the full stomach, as described by His, though perhaps the more usual, is not the only one, as Cunningham more frequently met with a position differing from that of the contracted organ only in being more horizontal.

Further, as Cunningham points out, the possibilities of changes in position and form of the full stomach will largely depend on the condition of distension of the intestines ; should downward displacement of the intestines be possible, then the position described by His will result, but when, from intestinal distension, the stomach cannot acquire the necessary space in this manner, then the liver, which forms so large a part of the roof of the stomach chamber, has to give way before it, and the horizontal position results.

The results obtained by the investigation of the human stomach during life, by the Roentgen rays, have, within the limitations of the method, confirmed these anatomical observations.

This method, first employed by Cannon in animals, consists in the introduction into the stomach of food (gruel), 400 grammes, impregnated with bismuth subnitrate, or, as this salt has been responsible for certain toxic symptoms (nitrite poisoning), bismuth carbonate, 40 grammes. These salts, being opaque to the Roentgen rays, enable the form and position of the stomach to be investigated by the fluorescent screen.

It must be noted, however, that the outlines of the shadow of the stomach contents do not necessarily correspond with the anatomical curvatures of the stomach, but with the curvatures of those portions of the stomach which constitute its superior and inferior limitations.

Following Rieder, who was the first to successfully employ the method in human beings, other observers, notably Holzknecht, Roux and Balthazard, Leven and Barrett, Jonas, Jolasse, Groedel, have utilised this method of examination with, briefly, the following results :—

In the majority of cases, 80 per cent. to 98 per cent., the stomach shadow, as seen with the subject in the erect posture, has roughly the form of a vertically disposed hook, the cardiac portion extending down from the left cupola of the diaphragm to a plane below the umbilicus, and the pyloric portion bending sharply upwards to the pylorus. This fish-hook type (angelhaken form) is regarded by Rieder as representing the normal stomach form, on account of its great prevalence.

Groedel, who found this type in 91 out of 100 healthy subjects, describes the radioscopic appearances as follows: immediately below the left cupola of the diaphragm (below and somewhat posterior to the apical portion of the heart) there is a bright, somewhat semicircular area—" magenblase "—corresponding with the fundus of the stomach, distended with air; below this, the shadow of the stomach contents extends almost vertically downwards, keeping to the left of the middle line, at first slightly contracting, and then expanding to form a saclike expansion (stomach sac, pyloric vestibule?) about the level of the umbilicus; from this the shadow of the pyloric portion bends sharply upwards, and ascends in the middle line, inclining slightly to the right, to terminate at the pylorus, which may be situated in the middle line or to the right of it, and is always separated by a distinct interval from the shadow of the liver.

As viewed laterally, the stomach shadow extends obliquely downwards and forwards, the magenblase lying below and posterior to the heart and appearing to press this forwards against the anterior thoracic wall; the stomach sac lying against the anterior abdominal wall.

In the supine position, the air in the magenblase is displaced and the corresponding bright area is no longer visible; the stomach sac also disappears, so that the shadow, as a whole, becomes smaller and somewhat sandal-shaped.

In a small percentage of cases (20 per cent., Holzknecht; 10 per cent., Kraus; 1 per cent., Groedel) the stomach shadow is more obliquely disposed and somewhat cornuate in form—a type which has been specially described by Holzknecht as the "stierhornform" (cowhorn type), and is regarded by him as the true normal stomach form.

In this type, the shadow gradually contracts from the magenblase to the pylorus, and curves obliquely across the abdomen, the pylorus being the most dependent part of the stomach and situated above the umbilicus.

According to Holzknecht, from 80 per cent. to 98 per cent. of normal individuals have abnormally formed stomachs.

Rieder and his followers, Groedel in particular, regard this type as anomalous, the latter observer meeting with one example only, and that in a female with an abnormally low abdomen, and he further noted that such a shadow might be obtained as a result of gaseous distension of the colon and of insufficient filling of the stomach. It would appear to correspond with the horizontal position of the stomach as described by Cunningham.

Groedel further determined that there is an essential difference in the form of the male and female stomach. In the male, the stomach is shorter and lies more obliquely ; in the female, it is more vertical, the descending part is longer, the sac broader, and the ascending or pyloric part shorter. Irregularities in form were more frequently met with among females, a deep indentation, about the middle of descending part and corresponding with the waist, being very frequent ; in some, particularly in multipara, this constriction was so marked that the descending portion below it appeared to expand like an inverted funnel. The typical hook form, or, as Groedel terms it, the siphon form, since he believes that it empties by a siphon action, occurred in about 50 per cent. of the females examined, the remainder showing greater or less deviation from the type.

As regards age, Groedel found the hook type in a child of 3½ years and in all of 18 cases aged below 16 years. He concludes that, whilst the form and position of the stomach may be influenced by such factors as bodily conformation, roominess of the abdominal cavity, character of the abdominal wall, position and condition of intestines, as is shown in the sex differences, yet the hook or siphon form is fundamental and constant.

Simmonds, from an investigation of the stomach form in the cadaver, found that, in the majority, it conformed to Rieder's type, the smaller curvature, as described by Rosenfeld, passing at first down and to the left, then for a greater or less extent almost vertically, and finally bending up to the pylorus.

He also concluded that, in the normally situated stomach, the pylorus and the lesser curvature are completely covered by the normally formed liver. In sucklings, the stomach has a similar form, the lesser curvature being more horizontal, and its concavity directed dorsal rather than towards the right, owing to the elevation of the greater curvature by the intestines. With the assumption of the erect posture and walking, this position becomes less common, and finally gives place to the vertical position in some 75 per cent.

THE MOTOR FUNCTIONS OF THE STOMACH.

The living stomach, as seen during operation or by the fluorescent screen, and occasionally the formalin-preserved post-mortem organ, may appear to be divided by a deep constriction on the greater curvature into two distinct parts—a proximal saccular part with relatively thin walls, and a distal tubular part with thick contracted walls—divisions which have been termed by Cunningham the cardiac sac and gastric tube, and which are apparently the fundus and the pyloric portion, as defined by the physiologist.

This differentiation of the stomach, recognised more than a century ago by Sir Everard Horne, both in the stomach of the dog and in the human stomach, as being due to muscular contraction, corresponds with a particular phase in its physiological activity, and is the probable explanation of the congenital contraction of the stomach, or congenital hour-glass stomach, described by Roger Williams and others.

The X-ray observations of Cannon on animals, and of Roux and Balthazard, and of Holzknecht on human beings, have shown that the stomach, so far as its motor functions are concerned, consists of two physiologically distinct parts—the fundus (including the anatomical fundus and proximal half of the body) and the pyloric part (including the distal half of the body the preantral portion of Cannon, and the pyloric portion of the anatomists).

The fundus or cardiac sac, into which the food is received and retained, is capable only of tonic contraction, and also, as Sick has more recently shown, of an active diastolic relaxation, which, occurring with the entrance of food, obviates any increased intrafundal pressure. The tonic contraction of the fundus serves to gradually squeeze the digesting food into the pyloric portion or gastric tube. The musculature of this latter part is capable of more vigorous action, contracting rhythmically, constriction waves (apparently not true peristalsis), beginning about the middle of the body of the stomach, pass along it to the pylorus, every 10 to 20 seconds, increasing in depth as they go, and at the junction of the body with the true pyloric portion (incisura angularis) occasionally attaining to such a depth as to completely separate the stomach into two cavities. The digesting food is thus carried into the pyloric canal, which serves as a mill, and as an ejector.

Anatomical manifestation of this physiological differentiation of the stomach obtains only as the stomach is emptied into the duodenum. At the beginning of digestion, the anatomical pyloric part alone is tubular, the whole of the body being saccular, but, with the incidence of the constriction waves, carrying the digesting food into and through the pyloric canal, more and more of the distal part of the body becomes tubular, until a point, a little beyond the middle of the body of the stomach, is reached.

A further demonstration of this difference in the motor activity of the two portions of the stomach was obtained by Moritz, and, more recently, by Sick ; and by Sick and Tedescko, from manometric tracings of the intragastric pressure of the empty and moderately full stomach, obtained by the employment of india-rubber bags fixed to the end of a stomach tube, and distended within the stomach. Records obtained in this manner showed that the average pressure in the fundus was maintained at from 6 to 8 cm. of water, with slight rhythmical variations, occurring twice or four times per minute, or from 2 to 5 cm. [Moritz], from 1 to 1½ cm. [Sick], due to active variations in the tonus of the muscle. Other variations were observed by Sick to depend on respiratory movements and on the heart's action. The respiratory variations, which possibly are of importance in producing admixture of the contents of the fundus, lay, as a rule, between 3 and 4 cm., but at times were double or even three times this average, even without forced respiratory movements.

In the pyloric part of the stomach, on the other hand, whilst the average pressure was about the same, much more considerable variations in pressure were noted, extending at times to half a metre of water; these powerful contractions of the pyloric musculature occurred in groups with intervals of average pressure. In the dog they occurred more regularly; each contraction began slowly, increased rapidly to a maximum, and then suddenly fell again. Sick could not obtain any record of these pyloric contractions in the empty stomach, nor yet after the introduction of a second tube into the empty fundus, but only some time after the introduction of food into the same. In pathological conditions, with increased motor activity (pyloric stenosis), this observer found that whilst this difference in type of muscular activity between the fundus and pyloric portion was maintained, it was less distinct, owing to the incidence of irregular, powerful contractions in the fundus. Similarly, when the walls of the fundus were artificially distended with an internal pressure higher than 20 cm. of water, there were superadded to the normal slight variations of tonus, periodic contractions of great intensity, similar to those normally occurring in the pyloric part.

In atonic conditions of the stomach, Sick found that the motor power was greatly reduced, and that the pyloric type was no longer evident.

As to whether the fundus and the pyloric portion of the stomach are ever completely shut off one from the other by a localised sphincteric action of the circular muscular coat, and, if so, in what circumstances, and at what point, are questions requiring further elucidation.

It is generally believed that, during normal digestion, the constriction waves, commencing about the middle of the body of the stomach (preantral portion of Cannon) travel to the pylorus, but are never so deep as to cause a separation of the stomach into two cavities. Occasionally, however, it has been noted that such a separation may be brought about by contraction of the circular fibres at the junction of the body with the pyloric portion (incisura angularis), and this part of the circular coat, though in no way differentiated from the remainder of the pyloric musculature, has been termed the sphincter antri-pylorici [Hofmeister, Schütz, Moritz] or sphincter aditus vestibuli [Gray]. This physiological sphincter

—the transverse band of the older observers—was apparently first seen *in vivo* by Kelling in dogs and human beings. He describes its contraction as reducing the lumen of the stomach to an oval or triradiate slit, on the fundal side of which the coarser particles of food are retained, and any such that may have passed into the pyloric portion are at once passed back again to the fundus. The passage of material from the fundus to the pyloric portion occurs intermittently, and may be interrupted for a long time by the ingestion oı fluids.

Schemiakine concludes that this so-called sphincter may completely shut off the two segments of the stomach from each other. Magnus noticed its frequent occurrence in cats, and found that it could be induced by the administration of morphia, which suffices to inhibit the passage of material from the fundus to the pyloric portion for hours. Kaufmann was able to produce complete closure of the sphincter in dogs by stimulation of the vagi in the œsophagus. Cannon observed complete contraction in vomiting. Sick and Tedescko noticed this sphincteric action in only a few of their observations, where the muscular activity as a whole was greater than usual, which could not be regarded as proving it a physiological occurrence. Still, as the constriction always occurs at the beginning of the pyloric portion of the stomach and never elsewhere, they regard the existence of such a physiological sphincter as probable.

In a boy, of 14 years, on whom gastrostomy had been performed, they examined the interior of the stomach with the aid of a cystoscope, and saw the entrance into the pyloric portion very distinctly delineated from the walls of the body of the stomach as a triangular opening, which contracted rhythmically with the adjacent portion of the body, but never completely closed; the stomach, however, contained only water during the observation. More recently Gray has insisted on the complete shutting off of the two portions of the stomach by this physiological sphincter as a phenomenon of normal digestion.

According to this observer, the pyloric portion and the body of the stomach are completely shut off from one another by this sphincteric contraction when food enters the stomach, and relaxation occurs, allowing the food to pass on into the pyloric portion only after an appreciable time—10 to 20 minutes with pure carbohydrate food, 30 to 45 minutes or more with proteid food—during which time it undergoes preparation by being churned up by the constriction waves, which pass over the distal half of the body of the stomach (preantral portion of Cannon). The proximal part or the body (cardiac sac of Cunningham) he regards, from the absence of visible waves of contraction, as a sort of overflow reservoir to the distal part.

The old idea that a general churning up of the food occurs in the stomach appears to be erroneous. Grützner and others, by the examination of the frozen stomachs of animals, which had been fed on different coloured foods, and killed at various stages of digestion, show that foods of a porridge consistence remain in the fundus arranged in layers, the most recently ingested occupying a central position [Grützner], or a superficial position [Ellenberger, Scheunert]. Only such portions as are in contact with the mucous membrane being acted on by the acid gastric juice, while, in the interior of the mass, which preserves its alkaline reaction, salivary digestion continues undisturbed.

The longer the food remains in the fundus, the more acid does it become, but, as regards its content in hydrochloric acid and pepsin, it is never a uniform mixture. The superficial layers of the food, as they are digested by the gastric juice, are gradually squeezed into the pyloric portion by the tonic contraction of the fundus, and then undergo a complete churning by the peristaltic-like contraction of that part of the stomach.

It may happen that the food last ingested may be the first to pass into the pyloric portion, and, according to O. Cohnheim, water may pass through a stomach filled with acid contents, and reach the duodenum almost neutral.

Sick demonstrated a similar occurrence in the human stomach. Administering either carmine or charcoal after a meal of thin gruel, he found after 15 or 20 or even 25 minutes that the contents of the pyloric portion were free from pigment, whilst those of the fundus were uniformly pigmented, whilst, after 30 to 40 minutes, the pyloric contents were pigmented. He further found that the contents of the pyloric portion were fluid and homogeneous, whilst those of the fundus were lumpy, more coherent, and contained more mucus. When vomiting was induced within 15 minutes after such a meal, the first portion of the vomitus was coloured, the later not so.

The presence of food in the stomach is generally regarded as the necessary physiological stimulus for the gastric musculature.

Boldireff has shown however that, in the empty stomach (dog), there occur periodical contractions lasting for from 20 to 30 minutes at intervals of 1½ to 2½ hours, which cease with the onset of digestion, with the ingestion of water, with sham feeding even before the commencement of secretion, with the presence of fat and acid in the small intestine.

Edelmann regards the contractions of the normal stomach as dependent on the secretion of hydrochloric acid, since they follow it in time, are influenced by its intensity, cease with its neutralisation or dilution, and only reappear when the stomach contents have regained their normal acidity.

All stimuli which provoke a secretion of acid gastric juice also originate contraction of the gastric musculature. He found that CO_2 also was capable of producing contractions, and further that mechanical stimuli are relatively ineffective, in contradiction to Ducceschi, who found that increased pressure on the stomach wall led to increased muscular activity.

The activity of the gastric musculature can be readily influenced reflexly. Cannon and Murphy found that rough handling of the intestine, after laparotomy, may inhibit pyloric contractions for a long time; opening the peritoneal cavity also causes immediate cessation of contractions [Auer], irritation of the animal also inhibits such movements. In horses, Scheunert found that energetic bodily movement very considerably retards the emptying of the stomach.

THE PYLORUS.

The musculature of the pyloric canal, as described by Cunningham, presents certain peculiar features: both the longitudinal and circular coats have a greater thickness here than in any other part of the stomach; the circular fibres, being disposed in the form of a thick sphincteric muscular cylinder, surrounding the entire length of the canal, and abruptly increasing in thickness at the duodeno-pyloric constriction to form the pyloric sphincteric ring. Of the longitudinal coat, the deeper fibres terminate by passing into the substance of the sphincteric ring, many reaching its deep aspect where they end; the more superficial are continued for a short distance on to the duodenum superficial to its circular coat, and then give place to the proper longitudinal coat of the intestine. The arrangement of these longitudinal fibres suggests that those of the deeper layer will act as a dilator of the pyloric orifice when the ring is relaxed, while those of the superficial layers will pull the initial part of the duodenum back over the thickened end of the pyloric canal, and so facilitate the passage of material into the duodenum. Although the pyloric canal is not yet physiologically recognised as a special portion of the stomach, yet its powerful musculature would indicate that it has some important function in the motor mechanism of the organ. The fact that, in the so-called hypertrophic stenosis of infants, the whole musculature of the canal is involved, the longitudinal layer being relatively more hypertrophied than the circular, led Cunningham to the conclusion that the muscular cylinder in its whole length exercises a double function, and acts both as an expelling or a retaining mechanism.

This pyloric mechanism is controlled reflexly both from the stomach and from the duodenum. At rest the pylorus is probably closed by tonic contraction of the sphincteric ring, the further contraction of which may be brought about by various reflexes arising chiefly from the duodenum, and also from the stomach.

Hirsch, Von Mering, and Moritz showed that the presence of chyme in the duodenum caused closure of the pylorus, and they regarded this as a result of mechanical stimulation of the duodenal mucosa.

Pawlow, on the other hand, found that gastric juice, or dilute HCl, was equally efficient, and regarded the stimulus as being of a chemical nature. Tobler regards both mechanical and chemical reflexes as possible, the latter being the more active.

The effect of milk, poured into the duodenum, in producing closure of the pylorus, discovered by Von Mering, was shown by Pawlow not to be the result of mechanical stimulation, but of the presence of unsaponified fat. It would thus appear that the pylorus will remain closed so long as the duodenum is loaded with food, so long as its contents have an acid reaction, and so long as it contains unsaponified fat. The effect of this is to protect the duodenum against an undue inflow of acid material, which might have a damaging effect, and to ensure the proper performance of intestinal digestion. Further, as Tobler has shown, it ensures the proper continuation of gastric digestion, for when the acid contents of the stomach were allowed to escape by a fistula immediately on entering the duodenum, and so to prevent reflex closure of the pylorus, he found that the gastric digestion of meat was much less complete than under normal conditions. Various stimuli, acting on the gastric mucosa, also appear to lead to contraction of the pyloric sphincter, or perhaps to an inhibition of the dilator mechanism. Fluids leave the stomach more quickly than solids, from which it would appear that mechanical stimuli will cause closure of the pylorus, a point which was further established by Cannon, who found that a solid pellet in the food would delay the emptying of the stomach. Otto and Carnot, and also Chassevant, showed that isotonic salt solutions leave the stomach more quickly than water, or hypertonic salt-solutions, both of which are retained until they are rendered approximately isotonic by admixture with gastric juice or transudations.

Müller found that fluids, at the body temperature, passed through the pylorus more quickly than such at a higher or lower temperature.

Cannon has established that foods will leave the stomach at different rates, which seem to vary inversely with their acid combining powers. Thus carbohydrates, which are readily saturated with acid, leave the stomach very quickly; previous treatment with sodium bicarbonate leads to delay in their passage through the pylorus. Proteids, already saturated with acid, leave the stomach more quickly than normal proteid. Acids, introduced into the stomach through a fistula, cause the pylorus to open, alkalies cause it to close.

The introduction of acid into the isolated stomach in Ringer's solution causes the pylorus to open. Ligature of the pancreatic duct leads to delay in the emptying of the stomach. Lastly, he found that proteids will leave the stomach more rapidly when the pylorus is joined to the intestine below the duodenum.

Kotschkowski found that the proper action of the pylorus depended on the stomach contents having a normal acidity; with hyperacid values of 0·7 per cent. to 0·8 per cent. there resulted prolonged spasm of the pyloric sphincter.

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THE MEDICAL INSPECTION OF SCHOOL CHILDREN.

By RALPH P. WILLIAMS, M.D., B.S., D.P.H.,
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THE education authorities in several cities anticipated the Education (Administrative Provisions) Act, 1907, by appointing medical officers to carry out the inspection of school children.

Of these, one was the Education Committee of the City of Sheffield, and the following is a short account of the work which has been done.

Apart from preventive measures, put into force by the Medical Officers of Health of the City in epidemics affecting the school children, the work may be said to have had its beginning after two lectures delivered to the elementary school teachers in 1894, by Professor Simeon Snell, Ophthalmic Surgeon to the Sheffield Royal Infirmary.

These lectures were published in the following year in a small volume entitled *Eyesight and School Life*, which remains to-day one of the most valuable works on the subject.

In consequence of these lectures, simple testing of the children's eyesight was undertaken by the teachers, and, in this way, large numbers of children, whose defective sight would otherwise have escaped detection, obtained medical advice and treatment.

The next step in the work was the appointment, in 1905, of Dr. Charles Porter (now Medical Officer of Health for Finsbury), then Deputy Medical Officer of Health in Sheffield, as a part-time Medical Officer to the Education Committee.

During his term of office, the course of lectures to the teachers on school hygiene was originated, and the weekly lectures at the Training College were also begun.

Schools were visited by him on three afternoons per week, the children inspected, and, when necessary, examined; the parents of those children requiring treatment being informed by letter.

On his resignation at the end of 1906, I was appointed as a whole-time Medical Officer, and the work was, for the first year, carried out on the same lines as before.

Each of the 101 elementary schools in the city was visited, the procedure adopted being as follows:—

In company with the head teacher, each class was inspected by the medical officer, and any child observed to be suffering from any physical defect was examined. At the same time, notes were taken as to ventilation, lighting, etc., of the school itself, and recommendations made when necessary.

Letters were then sent to the parents of those children who required treatment. The results of the letters were recorded by the teachers, and, at the end of one month, if no action had been taken by the parents, another more urgent letter was sent. The number of children receiving treatment as a result of these letters was not very encouraging, about 40 per cent. only of the parents responding.

In connection with the visits the following figures may be of interest (these are represented graphically on the accompanying chart, Fig. 1).

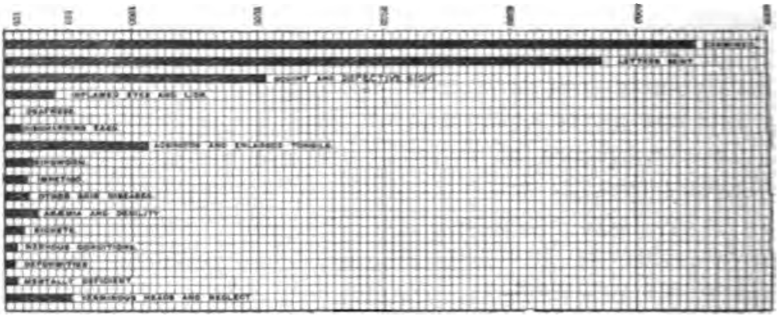

Fig. 1.

Of the 76,000 children on the rolls, those actually in school at the time of the visit, viz., 66,590, were inspected, and, of these, 5,475, who were obviously physically or mentally defective, were examined. In 4,741 cases, it was thought advisable to send a letter to the parents, requesting them to obtain medical advice. In this connection, it may be mentioned that, in order to prevent, as far as possible, hospital abuse, the letter was worded as follows:—

DEAR SIR (MADAM),

DURING my visit of inspection to school, I have observed that your child *A.B.* is suffering from .

If you have not already done so, I strongly recommend that you should consult your family doctor concerning him (her) without delay.—Yours faithfully—.

Of the children examined, nearly one-half were suffering from defective eyesight, the previous testing, which had been performed by the teachers, accounting for a large number which were brought to my notice.

In carrying out a superficial inspection of a large number of children, it is useful to inspect the class from the back ot the room, as, in this way, bald patches on children's heads may be detected, and ringworm cases excluded.

This disease is of great interest in connection with school hygiene. I met with 202 cases in the schools, and, on a circular being sent to the head teachers of all departments, it was found that 838 children, suffering from this complaint, had been absent during the school year. The average loss of attendance was 5½ weeks for each case, which would account for a loss of grant of about £220 in the year.

In many instances, the disease occurs in children whose parents are indifferent to its spread, with the result that the children are treated with ink and tobacco dust, returning to school to infect their schoolfellows.

Dr. Meredith Richards, in his Report for 1907, on the Health of Croydon, and in a recent Paper[1] there describes the X-ray treatment of ringworm in elementary school children, and, in view of the loss of grant which this disease causes, no doubt municipal treatment by X-rays for the poorest class of child would be a great saving in money.

The evils of the attendance prize system must strike any medical man connected with school work. It no doubt clashes with the interests of the children, both as regards individual health and also as regards public health.

The parents, in many cases, are more to blame than the children, for they are so anxious that the coveted first-class prize (never absent, never late) should be obtained, that they will send children to school who, even on casual inspection, are seen to be ill enough to be in bed. The work of the teachers is also made more difficult, for, if the child has a sore throat they hesitate to send it home at once, if by so doing a "special" prize would be lost.

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[1] Control of Ringworm in School Children," *Public Health*, September 1908.

This prize system has been altered in Sheffield to one which places good conduct and efficiency before perfect attendance, allowance being made for absence owing to illness (infectious or otherwise).

The new system has now been in force for a year, and will doubtless be of great value in lessening the spread of infection, and giving teachers greater freedom in excluding sick children.

Neglected Children.—The Medical Inspector is brought into contact with a large number of cases of neglect. These vary greatly in degree, from such comparatively slight conditions as untreated blepharitis, to cases in which the children apparently receive no attention whatever from their parents, with regard to either clothing or cleanliness. Consequently, they are clothed in rags, and are the victims of pediculosis, both of head and body.

Sheffield is fortunate in possessing a large staff of lady health inspectors.

In 1900, two of these were appointed, for the purpose of visiting the homes of women who had been recently confined, and of giving advice, when required, on the upbringing of infants. The work has been extended to the inspection of women's workshops, of lodging-houses, and also to the investigation of school complaints.

The staff has gradually increased, and there are now fifteen ladies engaged in this work.

The qualifications now required are that each inspector shall be a trained nurse, a certificated midwife, and hold the certificate of the Sanitary Institute.

During the year 1907, 548 cases of neglect were reported as the result of medical inspection, the homes of these children were visited by the Lady Health visitors, and in most cases marked benefit resulted from these visits.

When improvement does not take place in the child's condition, the Medical Inspector visits the home, and warns the parents. If this has no result, section 10 of the Prevention of Cruelty to Children Act, 1904, is put into force.

So far as I am aware, Sheffield is the only authority, which puts into action this statute, so it may be of interest to quote a case:—

"Two boys, attending a council school, were several times reported on account of their suffering from pediculosis. The home was visited by the Lady Health Inspector on several occasions. No improvement took place. Consequently, the home was visited by me and found to be in a filthy condition. The mother was warned, and the home kept under observation.

"A month afterwards, on a further visit being paid, the condition of the home was found to be, if anything, worse. An order was therefore obtained, on application to the magistrates then sitting, to remove the children 'to a place of safety.' They were removed the same day by an inspector of police to the Cottage Homes of the Poor Law Union. The mother was subsequently prosecuted, and received six months' imprisonment."

This section of the Act is a most important one. No bodily harm had been done to the children, and they were not starved. They were simply being kept in a house which was, owing to the mother's neglect, absolutely unfit for human habitation, and therefore their health was likely to suffer.

In this connection, I might say that we work independently of, but in hearty co-operation with, the inspectors of the National Society for the Prevention of Cruelty to Children, the inspectors giving evidence (when they are in a position to do so) in our cases, and the Lady Health Inspectors giving evidence in the Society's cases.

The moral effect of a case of this kind, in the immediate neighbourhood of the children's home, is excellent.

There is no doubt that one of the first objects of the medical inspection of school children is to obtain a better standard of cleanliness at school, and, in the worst cases, prosecution of the neglectful parents on the above lines will have to be undertaken.

School Nurses.—With regard to less serious conditions of neglect (especially the widespread prevalence of pediculosis amongst the girls attending the schools), it has been found that the Lady Health Inspectors, now that the Notification of Births Act has added considerably to their duties, are unable to cope with the amount of home visiting which is necessary.

An arrangement has, therefore, been made with the Queen Victoria Jubilee Nursing Association, and the whole-time services of three nurses obtained.

Their duties consist in assisting the school medical officer in examining the children (on the lines laid down by the recent memorandum of the Board of Education) in the "poor district" schools. The parents are invited to the first examination, but, at present, a large percentage do not attend; the nurse, therefore, visits the homes of those children requiring medical treatment, taking with her the note indicating the defect which has been found.

The necessity of treatment explained to the mother by a tactful nurse will, no doubt, increase the proportion of cases obtaining treatment to a very great extent.

When not engaged in assisting the medical officers in the routine examination, each nurse has a list of "poor district" schools, which she visits, and in which she examines the children with regard to cleanliness. Home visits are made when required, and a list of children who require medical treatment is made. The medical officer, within a few days, visits the school and examines the children selected by the nurse.

In this way it is hoped that early cases of tuberculosis, scabies, ringworm, etc., will obtain suitable treatment, letters from the doctor being taken to the homes by the nurse as before.

The visits of the nurses will also be of value in the prevention of unnecessary loss of school attendance, owing to such condition as sore head, where often the parents are only too glad of an excuse to keep the child away from school. Revisiting the home after an interval of a few days will be necessary in cases of this kind, and the prosecution of those parents who do not carry out the instructions for cleansing must follow.

It appears to me that the enormous work entailed in the medical inspection of 76,000 children can best be accomplished by this means, and the provision of a suitable number of trained nurses, combining the "pick-out" system with the official system of thorough inspection of each child at certain ages.

The number of nurses required in any area depends, to a great extent, on the poverty of the locality.

The number of medical officers required can be calculated provisionally on the basis that each man can examine 40 children per day, *i.e.*, 200 per week, or 8,000 per school year.

This will allow a small amount of time for special visits which may be made for investigating epidemics, etc.

In this connection, the senior school medical officer can only be considered a half-time inspector, the other half being fully occupied in supervising the work of the nurses, visiting special schools for mentally deficient children, lecturing on school hygiene, and writing reports.

Treatment.—It is obvious that if the treatment, found necessary by inspection, is not provided, the inspection will be useless.

The school medical officer's note to the parent recommends that the "family doctor" should be consulted, as of course the parents of a large proportion of elementary school children are quite capable of paying ordinary medical fees.

If the doctor consulted thinks that the advice of a specialist should be obtained, he then recommends either a private consultation or hospital treatment.

A number of children remain, however, who have no family doctor, and for these some provision must be made.

In Sheffield, an arrangement has been made between the Education Committee and the three hospitals (viz., the Royal Infirmary, the Royal Hospital, and the Children's Hospital) for the treatment of children whose parents are unable to pay.

The Committee pays for out-patient "recommends" at the rate of one guinea for six, and where it is found, on investigation, that the parents are not in a position to pay for advice, a "recommend" is issued from the Education Office.

The organisation for such investigation is complete, consisting, as it does, of information obtainable from the teachers, attendance officers, and school nurses, so that the possibility of 1½d. or 1d. each, the poorest children being provided with free meals.

This arrangement is practically self-supporting, the older girls assisting in the cooking required.

The results of the training provided for the feeble-minded are not encouraging, and no doubt that, in the majority of the cases, permanent after-care is necessary.[1]

Examination of Teeth.—In examining the mouths of 700 children, I have found 11 per cent. with perfect teeth. As the examination was not carried out with a dental mirror, this figure is probably too high. It is thus seen to compare favourably with Dr. C. E. Wallis's figures[2] (1·6 per cent. perfect) at the Michael Faraday School, and with Messrs. Layton and Wood's figures[3] (7 per cent. perfect) in the Kettering School.

Dental treatment, beyond sending the worst cases to the hospital, has not yet been attempted, although the necessity for it is very great.

Feeding of School Children.—The provision of free breakfasts is being carried out under the Education (Provision of Meals) Act, 1906.

There is no doubt that, in all great cities, medical inspection will show that there are a very large number of badly-nourished children attending school. As to whether this defective nutrition is due to insufficient feeding, or to improper feeding, it is often difficult to determine; a satisfactory conclusion can only be obtained by medical examination (including the weighing and measuring of the child), together with home visitation and investigation. The number of meals given during the last school year ended July, 1908, in Sheffield, was 103,053, at a cost of £693 9s. 1d. (*i.e.*, 1·6d. per meal).

The breakfast provided consists at present of cocoa and milk, with bread and dripping or bread and jam. Porridge has been recommended, and will probably be used in most oı the schools during the coming winter. If only one meal per day is to be given, breakfast is the best, as it comes before the hardest work of the day.

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[1] R. P. Williams: Feeble-minded Children, *B.M.J.*, p. 824, 1908.

[2] *The Care of the Teeth in Public Elementary Schools*, C. E. Wallis.

[3] *British Dental Journal*, September 1908.

In Bradford (where many mothers go out to work, and consequently are not at home to prepare a midday meal) dinners are provided. This work has been carried out under the supervision of Dr. Ralph Crowley, and is described by him in an excellent article published in *Public Health*.[1]

Lectures to Teachers on Hygiene.—One of the most important sub-divisions of the work of the medical inspector of schools is that of lecturing to teachers and to students at the training college on "Personal and School Hygiene."

The Sheffield Training College, I believe, stands first in the amount of time given to this subject, each student spending one hour per week during the two years' course (making in all about 80 hours).

The lectures are supplemented by practical demonstrations in the schools, visits being paid (1) to *special schools* for mentally deficient children where the physical signs of feeble-mindedness are shown, and the methods of educating this type of child demonstrated.

(2) *To schools in very poor districts*, where such diseases as ringworm, impetigo, and pediculosis are demonstrated.

The ventilation and lighting of the schools visited are commented on, and the older types of school building contrasted with modern schools.

(3) A special visit is paid to a building ventilated by the *plenum* system, where the students inspect the fan, fresh-air corridor, and heating pipes, subsequently visiting the class rooms, when the inlets and outlets are demonstrated.

(4) The students receive practical instruction in the simple tests for vision and hearing, and also in weighing and measuring the children.

The lectures are made as elementary as possible, the rudiments of anatomy and physiology being taught, and scientific nomenclature avoided, *e.g.*, I consider it quite unnecessary to burden students by asking them to remember the names of the bones. All they want is a good general knowledge of the structure of the body without minute details.

It is most important to remember that the elementary school teacher is the most valuable medium that we have for disseminating knowledge to the general public, not only in the teaching of children, who go home and tell their parents what they have been taught, but also because the teacher himself is generally the disseminator of knowledge in his own family circle.

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[1] "Meals for School Children," R. H. Crowley, M.D., *Public Health*, Feb. 1908.

For this reason, such subjects as the causation and prevention of tuberculosis, the prevention of rickets, the necessity for covering food to prevent fly infection, and the necessity for burning domestic vegetable refuse are fully dealt with.

The large number of students, about ninety in each class, is rather a disadvantage, as the use of the lantern, instead of diagrams, in illustrating the lectures is rendered necessary.

For the practical work the class is divided, 25 students at a time being taken to the schools.

In conclusion the medical inspection of school children should, when followed up by suitable treatment, be a powerful factor in the prevention of physical deterioration.

By suitable treatment, I mean not only the medical and surgical treatment of defects such as carious teeth, adenoids, skin diseases, etc., but the broader methods of open-air schools, sufficient feeding, and the provision of shower baths.

The appointment also, as school medical officers, of men who have had a thorough training in Physiology cannot but benefit the science of education as a whole.

A CASE WITH COMMENTS.

NEOPLASM OF THE KIDNEY PRESENTING CERTAIN UNUSUAL FEATURES.

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THE patient, a married woman, 55 years of age, was admitted to King's College Hospital,. complaining of swelling of the abdomen and epigastric pain. She was placed under the care of Mr. Boyce Barrow, M.B., F.R.C.S., to whom we are indebted for permission to publish these notes.

History Previous to Admission (Kindly furnished by Dr. Arthur Quennell.)—The patient was first taken ill in October 1907, when she complained of severe pain in the back. This pain was spasmodic, frequently attacked her when she was walking, and was so severe as almost to cause her to stop. The pain was described as "like a piece of wood boring into her back," and extended to the abdomen, as " a rim of pain all round."

This lasted till Christmas 1907, and, soon after that, she was so ill as to be forced to remain in bed for four or five weeks; her left leg became slightly swollen, but did not give any special trouble.

The patient now got up and about again, but was very weak, and the pain persisted. About one month before her admission to King's College Hospital, she had a severe attack of epigastric pain and vomiting.

Two or three doses of ♏x. Liq. Morphinæ Acet. were administered, part of each, however, being vomited; the result was to produce a condition of coma, lasting four or five days. The patient then recovered and felt much better. At this time, a swelling was noticed in the hepatic region, and, after recovering from her coma, the patient became jaundiced for a couple of weeks.

The urine contained a trace of albumen, and for a few days much blood was passed. There were no kidney elements, crystals, or fragments of growth.

On enquiry, patient said she had passed some blood in the urine about Easter time. Shortly afterwards she began to develop ascites, and this increased gradually till admission.

Despite the effect of the morphia, the patient was unaffected by Veronal or by Bromides, neither of which was of the least use for procuring sleep.

Condition on Admission.—The patient was wasted and very feeble. She seemed dull and apathetic, and could not give a clear or consistent account of her illness; she complained only of slight abdominal pain and swelling. She was not jaundiced.

The heart and lungs were normal. There was very slight œdema of the legs, which soon disappeared with rest in bed. No enlarged lymphatic glands could be felt. The abdomen was distended, and contained a large quantity of free fluid. The liver was enlarged and reached nearly to the umbilicus, the right lobe being the part chiefly affected. Its surface was smooth, and on it could be felt an oval lump to the right of the xiphisternum; there was no tenderness on palpation.

A second lump could be felt just above and to the left of the umbilicus; it was rounded and hard, and appeared to be about the size of a walnut. It was very deeply placed, did not move with respiration, and could only be felt with difficulty on account of the ascites.

The kidneys were not felt, and the spleen was not enlarged. The urine was normal in quantity and character, save for a trace of albumen.

A provisional diagnosis of diffuse carcinoma of the peritoneum was made, and, three days later, an exploratory operation was performed.

Ten or twelve pints of clear ascitic fluid, which was not bile stained, escaped. The lump in the liver was exposed, and was found to be sarcomatous in nature. Nothing further could be done and the wound was closed.

After the operation, the vomiting ceased, and the patient appeared to be much more comfortable, but at about 8.30 p.m., 5 hours after the operation, she suddenly became worse.

Her condition then was one of complete coma with widely dilated pupils, stertorous breathing, and rapid feeble pulse, and she was sweating profusely.

Despite stimulation and copious intravenous infusions of normal saline solution, the patient never recovered, but died about 20 hours after the operation.

During these 20 hours, no urine was voided, a catheter was passed 16 hours after the operation, and ℥iv. urine were drawn off.

This urine was high coloured and turbid, its reaction was acid, and it contained a small quantity of acetone.

Post-Mortem Examination.—At the post-mortem examination, the left kidney was found to be twice its normal size, it was soft and almost fluctuant on palpation, its surface was smooth and deep purple in colour.

The renal vein was distended and hard, and at its junction with the inferior vena cava formed a rounded lump nearly the size of a hen's egg.

The kidney was opened, and its increased size proved to be due to a growth which extended from it, along the renal vein, to the vena cava, which it also invaded. Below its junction with the renal vein, the vena cava was thrombosed, above, it was full of growth for about 2 inches.

The liver was enlarged, and its surface irregular, owing to numerous secondary deposits which were scattered throughout its substance; it also showed extreme fatty degeneration. The portal vein was thrombosed.

No deposits were found in any other part of the body. The suprarenal capsules, the right kidney, and all the other organs were normal.

On microscopical examination, the kidney was seen to be almost entirely disorganised, a few tubules and glomeruli could be distinguished towards the periphery. The glomeruli were slightly engorged, and there was an increased amount of inter-tubular material, which was markedly œdematous. The great bulk of the organ was composed of a meshwork of vessels, whose walls consisted of endothelium, which was rapidly proliferating outwards, forming a typical perithelioma.

Larger vessels could also be distinguished, the lumen of which was blocked with growth similar to that constituting the main mass. The endothelial cells, lining these vessels, were also in a state of rapid division.

The growth, occupying the interior of the vena cava, was identical in appearance with that in the kidney; the vessels from the endothelium, from which the growth proceeded, were specially striking.

The nodules in the liver, in parts, resembled a large round-celled sarcoma, but other parts were typically peritheliomatous.

The liver itself had undergone an extreme degree of fatty degeneration, and there was also some increase in the interlobular fibrous tissue.

The actual amount of liver tissue which was capable of carrying on its function was very small. In many areas, no liver cells could be recognised under the microscope, while those, which still remained, contained large globules of fat.

The points of special interest in the case seem to us to be:—

i. The entire absence of any symptoms—renal colic, hæmaturia, and the like—which would have drawn attention to the kidney. There was, as we have noted, some hæmaturia early, but this had completely ceased some time before the patient came to the hospital.

A possible explanation is that the occlusion of the renal vein had led to a complete cessation of function of the left kidney.

ii. The slight degree and transient nature of the œdema of the legs, and the absence of any enlargement of the veins of the anterior abdominal wall; the blood probably returned from the lower limbs by the ascending lumbar veins and the venæ azygoi.

iii. The cause of death, which followed so rapidly on an operation of comparatively small severity.

It is now generally accepted that a patient, with a fatty liver, is particularly liable to a complete upset of the hepatic functions, when subjected to the shock of an operation, and the poisonous influence of an anæsthetic.

We would suggest then that, in this case, death was due to this "hepatic breakdown" with consequent auto-intoxication, rather than to uræmia, the only alternative.

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NOTES FROM FOREIGN JOURNALS.

TREATMENT OF DYSPHAGIA IN TUBERCULOUS LARYNGITIS.

Dysphagia is almost invariably a troublesome symptom in tuberculous laryngitis. In a recent thesis, Proust mentions some of the more efficacious methods, especially that recommended by Fiocre, in which use is made of the anæsthetic properties of chloretone.

The first important point is complete rest of the larynx, speech being entirely suppressed. Local antisepsis is necessary in order to prevent secondary infections. Carbolic sprays are useful, as in the following:—

℞ Acidi Carbolici	gr. xv.
Cocainæ Hydrochloridi	gr. viiss.
Glycerini	ʒvj.
Aq. destill.	ad ℥xij.

Misce. Fiat lotio.

"One tablespoonful to be used for spraying from a Seigel's steam spray."

The patient places himself about 6 inches away from the apparatus, opens his mouth to its full extent, and keeps the tongue out by holding the tip in the fingers with a handkerchief in order to prevent it slipping.

The following is also recommended for spraying:—

℞ Acidi Carbolici Glacialis	gr. x.
Sodii Benzoatis	℥iss.
Tincturæ Eucalypti	ʒiij.
Glycerini	℥is.
Aq. destill.	℥xv.

The spray should be used three or four times a day, and for five minutes at a time.

Insufflation of powders gives good results. Escat's tube is recommended as the best. It has somewhat the appearance of a pipe. It is a glass tube about ¼ inch in diameter, one end of which is bent round in a full curve, and the other is bent up so as to form a small funnel. The powder is placed in the funnel, and the curved end is introduced, as far as possible, down the throat. Holding the tube with his lips, the patient makes a sudden inspiration. Escat uses the following powders:—

(*a*) ℞ Orthoformi,	
Lactosi	āā ʒi.
(*b*) ℞ Menthol	gr. j.
Cocainæ Hydrochloridi	gr. viij.
Anæsthesin.	gr. xv.
Pulv. Acaciæ	ad ʒiiss.

Aspirations are to be made twenty minutes before each meal. Escat's tube, which is easily carried about, and also easy to use, enables the patient to make frequent aspirations, and relieve the pains due to dysphagia.

At a later stage, when the pains are more acute and prevent sleep, the use of cocaine and of morphine is justifiable. Lermoyez prefers morphine, because the local anæsthetic effect, produced in the larynx, lasts longer than that of cocaine, which must be taken half an hour before the meal. Morphine should be ordered in the following way as a powder for insufflation:—

℞	Morphinæ Hydrochloridi	gr. xxx.
	Pulv. Sacchar. Lactis	gr. xxx.
	Pulv. Acaciæ	gr. xv.

Misce. Fiat pulvis.

Three-quarters of a grain of this mixture are used at a time for insufflation. An anæsthesia is obtained, which lasts half a day, and may even be prolonged until the next day. It is more usually necessary to repeat the insufflation one hour before each meal. Cocaine is also used in solutions of from 5 per cent. to 20 per cent. The 10-per-cent. solution is sufficient, as a rule, except in the case of very painful dysphagia. It is applied to the ulcerations by means of a swab.

Morphine and cocaine may be combined in a gargle, as in the following:—

℞	Cocainæ Hydrochlor.	gr. xxx.
	Morphinæ Hydrochlor.	gr. xv.
	Phenazoni	gr. xv.
	Glycerini	℥ij.

Misce. Fiat Mistura.

"One teaspoonful to be mixed with half a tumblerful of water and used as a gargle."

Chloretone may be used for insufflation or aspiration, but better results are obtained by means of sublimation. Fiocre has devised a very useful tube for this purpose. It is a glass tube, about 10 inches in length, with one end bent round in a bold curve. About 6 inches from this curved end, a bulb is blown in the top of which is a small opening to admit the crystals of chloretone. The other and straight end of the tube is fitted with a spring powder-push with a double bellows. A pinch of chloretone is placed in the bulb, which is plugged with a small piece of wool. The operator has the patient with his mouth widely open, and the tongue held out, seated before him. The bulb is then held above a small flame, for example, that of a Bunsen burner. After a few moments, the chloretone dissolves in the bulb, and is sublimed. The exact time to make the insufflation is denoted by the formation of whitish vapours inside the tube. The curved end of the tube is placed behind the base of the tongue and directed downwards, and insufflation is made at the moment of a deep inspiration. The anæsthesia obtained lasts about three hours, and, when the pain returns, it is not so severe. Repeating the dose gives rise to no trouble, and does not decrease the effect.—(*Journal de Médecine et de Chirurgie pratiques.*)

PHOSPHERGOT.

Paul Bellot writes on the value of this mixture of phosphate of soda and ergot, which was introduced some years back by Professor Luton of Reims.

It has, he thinks, been the victim of unmerited neglect, for he can find no mention of it in many of the books on therapeutics. He has himself, during the past ten years, obtained excellent results from its use as a nerve-tonic in cases of debility and of neurasthenia. It is in these particular classes of cases, presenting nervous asthenia or general debility, that phosphergot, as it was named by Luton, is pointedly indicated. The two substances, of which it is composed, have an established position, the one as a nervine, and the other as a cardio-vascular tonic. Robin, in 1892, demonstrated the value of phosphate of soda in the treatment of nervous diseases, and made great use of it in ataxia, hemiplegia, neurasthenia, and progressive muscular paralysis. Manquat, of Lyons, called attention to its valuable properties in his *Traité de Thérapeutique.* Böcker, in Germany, proved that the salt diminished all organic waste. Ergot has long been used as a cardiac tonic. Germain Sée showed its action upon slowing and regularising the pulse. It has besides been used by many eminent clinicians in paralyses. Brown-Séquard held that it was indicated in paralyses, accompanied by irritation of the motor, sensory, or vaso-motor nerves; in short, in cases of congestion, or of inflammation, of the substance of the cord or of its membranes. Bellot has found that the drug has seemed to be a source of energy in general debility, and has obtained his best results in neurasthenia and anæmia. He has seen moral and physical energy return in many cases of neurasthenia, and has preferred to use it, instead of iron, in many cases of anæmia accompanied by either amenorrhœa or menorrhagia. Spermatorrhœa, incontinence of urine, and the asthenia of diabetes have often been benefited to a marked extent by the use of phosphergot. Given in the doses indicated below, neither digestive troubles nor symptoms of ergotism have been observed.

One method of administration is to take, before breakfast, in half a tumblerful of water, a tablespoonful of a solution of phosphate of soda (gr. xlviii. in ℥i.) together with one teaspoonful of tincture of ergot. This represents rather more than one scruple of phosphate of soda and 15 grains of powdered ergot, which is a sufficient dose *pro die*, although Dujardin-Beaumetz and Yvon assert that as much as one and a half drachms of ergot can be given daily. This method has the disadvantage of leaving the measuring out of the appropriate doses to the patient, who, moreover, has to keep on hand a somewhat large amount of ergot. For these two reasons, Bellot prefers to order the following:—

℞ Sodii Phosphatis,
Pulv. Ergotæ (recentis) - - - ana gr. iv.
Misce. Fiat pulvis. Mitte tales numero xx. in cachet.

"One or two to be taken directly after each meal."

For children the dose must be reduced by one-half or three-quarters. The administration should be continued for 10 to 20 days, according to the nature of the case, and renewed after an interval at the discretion of the physician. It should be stopped during the menstrual period, unless the flow is too abundant. Bellot recommends the use of phosphergot, not as a panacea, but as a trustworthy therapeutic agent of undoubted efficacy, easily used, not expensive, and having frequent indications.—(*Journal de*

Médecine et de Chirurgie pratiques.)

SEPTIC GASTRITIS DUE TO ORAL SEPSIS.

Julien Tellier devotes a paper to the consideration of certain symptoms arising from oral sepsis, which he looks upon as a gastric form of sepsis of the mouth and teeth. He is of opinion that every chronic suppuration of the buccal cavity can bring in its train the production of gastric conditions, more or less well marked, but the existence of which is obviously dependent upon the presence of the suppuration. Proof of this is seen in the disappearance of the symptoms observed after a rational treatment based upon the ætiology. The cause, most frequently observed, of chronic suppuration in the mouth is infectious polyarthritis or pyorrhœa alveolaris. The lengthy duration of this affection, its extremely chronic character, its resistance to therapeutic measures, and the indifference with which it is most usually esteemed, either by medical men, or even by dentists, all go to explain, up to a certain point, the relative frequency of the distant complications which are observed. To some extent, it is true, these symptoms may be due to defective mastication of food; but Tellier attributes them to buccal infection, the constant source of gastric infection and toxæmia. The symptoms vary considerably, but have one feature in common, the presence of a particular odour of the breath. This is not simply what is ordinarily called "bad breath"; it is the smell of the special fermentation, which often allows a diagnosis to be made forthwith. Buccal infection very often exists without affecting the condition of the stomach, but in the last case, when the gastric symptoms are produced, the following forms can be distinguished:—

1. *The common form* with gastric discomfort, foul mouth, the special smell of slight fermentation, some loss of appetite. No painful crises, little or no intestinal troubles, no reaction on the general condition.

2. *The moderate form* (Hunter's septic gastritis) has the same subjective and objective sensation, loss of appetite with nausea, distaste for food, flatulent dyspepsia, little pain, except a feeling of weight in the region of the stomach, bowels out of order, slight effect on the general condition.

3. *The painful form*—gastralgia—has the same symptoms, only more marked, together with painful crises, at times very severe, without effect on the general condition, or feeling of weakness and exhaustion. It only differs from the preceding form by the appearance of the painful crises, and would not be worth noting, but for the reason that it is, at this stage, that patients, as a rule, make up their minds to seek medical advice. Ignoring the cause leads to failure in treatment, and the patients drift from one treatment to another without success. Upon this may supervene a moral condition, which even deserves the name of an asthenic form, but the occurrence of neurasthenia in consequence of prolonged stomachic affections is too frequent to be useful to lay stress upon it.

4. *The form with septicæmic intoxication* includes cases, which have marked points of difference, as, for instance, cases in which the digestive symptoms are more prominent, and the symptoms of intoxication are only shown by the pallor of the face, the tinted conjunctivæ, and diarrhœa. On the other hand, there are cases, in which the gastric symptoms take a minor part; and in which the general condition, following on the anæmia,

which results from the intoxication, ought to attract attention. In such cases, it is a question more of chronic septicæmia with digestive symptoms, than of septic gastritis with consecutive anæmia.

5. *The febrile form* is believed by Tellier to be relatively common. The septic condition is shown by digestive symptoms, emaciation, and pyrexia (up to 103° F.), but without somatic troubles. He has made out this class on the strength of one case.

Diagnosis of the different forms is easy, provided the cause of the gastric infection is kept in mind. In every case of gastric disorder, the condition of the mouth must be examined, and then the relation, when it exists, will become evident.

For treatment, there are two things to be done. Get rid of the oral sepsis, and remove the causes thereof. Symptomatic treatment of the gastric troubles is never more than adjuvant, and nearly always useless. To carry out the first condition, use will be made of various antiseptics, of which the most important are permanganate of potash (1 in 2,000, 3,000 or 4,000), and peroxide of hydrogen, using the 12-volume solution diluted to a half or a third. The patient must be ordered not to rinse out his mouth with the antiseptic solutions, but to give the mouth a regular bath, by retaining the solution for five to ten minutes every two or three hours through the day. As regards the second condition, the teeth must be properly overhauled and stopped, or extracted, as appears necessary, and the gums and mucous membrane of the mouth must be brought into healthy condition. The good effects of a thorough treatment are not long in showing themselves. When once the necessary extractions have been made, the patient, in a week or two, looks and feels a different being.—(*Journal de Médecine et de Chirurgie pratiques.*)

VULVAR VEGETATIONS IN PREGNANCY.

Rudaux, in *La Clinique*, points out the following as the best means for dealing with the vegetations on the vulva, which are often so obstinate to treatment, in pregnant women.

(1) Wash out the vagina twice a day, not using much pressure, with 2 litres (3½ pints) of boiled water, containing 15 grains of permanganate of potash.

(2) After the injection, irrigate, under high pressure, using a tube with only one opening, with a 1 per 1,000 solution of aniodol, or a one-per-cent. solution of lysoform.

(3) Cover the vegetations with this powder:—

℞. Zinci Oxidi,
Acidi Tannici - - - - ana ʒj.
Talci - - - - - - ʒiij.
Misce. Fiat pulvis.

(4) Every other day apply with a swab, well soaked in it, some 10-per-cent. solution of nitrate of silver, or touch them lightly with pure peroxide of hydrogen solution, or with a 50-per-cent. solution of chromic acid.

If the vegetations are very large and oozing, remove them with a thermo-cautery during the ninth month, and then apply aniodol powder.

Reviews of Books.

A Manual of Venereal Diseases. By OFFICERS OF THE ROYAL ARMY MEDICAL CORPS. Introduction by Sir ALFRED KEOGH, K.C.B., Director-General of the Army Medical Service. History, Statistics, Invaliding, etc., Lieut.-Colonel C. H. MELVILLE, R.A.M.C., Secretary to the Advisory Board. Clinical Pathology and Bacteriology, Colonel LEISHMAN, R.A.M.C. Clinical Course and Treatment, Major C. E. POLLOCK, R.A.M.C. London: Oxford Medical Publications.

THIS Manual of Venereal Diseases is one of the Oxford Medical Publications, and is based on the reports of the Sub-Committee appointed, in 1903, to consider the treatment of venereal diseases in the Army. The general question of diagnosis and treatment is dealt with by Major Pollock, while the pathology and the microscopical investigation, with special reference to the Spirochæte Pallida, have been undertaken by Colonel Leishman.

It is superfluous to state that the pathological portion of the work is of the highest excellence, containing, as it does, a clear and concise account of the technique to be employed in the search after the spirochæte, together with a description of the serum diagnosis of syphilis. The comparative value of the different methods of treatment of syphilis is discussed, and the advantages of intra-muscular injections are clearly emphasised. The treatment of gonorrhœa, and of its complications, and of soft chancre is also fully described. The work is modestly designated as a convenient manual for officers of the R.A.M.C., but to anyone interested in the study and treatment of syphilis, it cannot fail to be of the greatest value, and it is, further, an eloquent testimony to the untiring efforts of military surgeons in the elucidation of the difficult problems of the treatment and prophylaxis of Venereal Diseases in the Army.

Syphilis in the Army: Syphilis in the Army and its Influence on Military Service, its Causes, Treatment, and the Means which it is advisable to adopt for its Prevention. By Major H. C. FRENCH, Royal Army Medical Corps; Fellow of Royal Institute of Public Health; Associate King's College, London; War Office Specialist Appointment in Venereal Diseases and Dermatology, Royal Herbert Military Hospital, Woolwich. London: John Bale, Sons and Danielsson, Ltd.

THIS work deals with syphilis in the Army, and with the steps taken to cope with the disease, especially in India, and will be of greater interest to the military surgeons employed in that country than to those who are in practice at home. The author is in favour of the inunction in hospital patients rather than intra-muscular injections, though, for out-patients, he does employ the latter method. Many statistics are appended as to the prevalence of the disease in the British Army at home and abroad, and the main object of the work is to show the detailed working of a preventive medicine in the Army, a system, however, which is not applicable for home consumption, though it may be tolerated in India.

The Experimental Prophylaxis of Syphilis. By DR. PAUL MAISONNEUVE; containing the results of the experiments on the subject carried out at the Pasteur Institute by PROFESSORS METCHNIKOFF and ROUX. Translated, and with an introduction by FERNAND L. DE VERTEUIL, M.B. (Edin.), M.R.C.S., L.R.C.P., Surgeon R.N. Bristol: John Wright & Co.

THIS work commences with a description of the various experiments carried out by Metchnikoff, Roux, and others at the Pasteur Institute, with the object of neutralising the virus of syphilis, either by the introduction of a serum, or by the application of medicinal agents, such as strong calomel ointment.

Its author, P. Maisonneuve, offered himself, in the interest of science, as a subject for inoculation with syphilis, and, as is now well known, the experiment was carried out in a manner satisfactory to all concerned. The enthusiast was duly inoculated with the secretion from two syphilitic chancres, the calomel ointment was applied in the proportion of one part to three of lanoline, and no traces of constitutional infection supervened later. The strictest precautions were taken to exclude all possible sources of error, and the control experiments on monkeys appeared to confirm an important landmark in the preventive treatment of syphilis. It is well, however, to point out that other observers have not met with equally satisfactory results, and such a high authority as Neisser states that he has carried out the same experiments, but that the results obtained had not always been positive. In these circumstances, it is to be hoped that the number of zealots, offering themselves for inoculation, will be limited, otherwise the statistics may point to a sudden rise in the incidence of syphilis.

Syphilis of the Spinal Cord. By Prof. GILBERT and DR. LION (Actualités Medicales). Paris: Librairie J. B. Baillière et Fils.

THIS interesting question is dealt with by the authors, as one of a series entitled Actualités Medicales. The work commences by a consideration of the ætiology of the condition, and considers that the predisposing causes are the gravity of the original attack of syphilis; neglected, or insufficient treatment, hereditary, or acquired predisposition of the nervous system, whilst age, sex, venereal, or alcoholic excess, cold, and overwork are important causative factors of this condition. Under the head of pathological anatomy are described the following varieties of spinal syphilis: gummata of the meninges and of the cord, meningo-myelitis, endarteritis, primary syphilitic softening, sclerosis, and pachymeningitis. The clinical varieties, the diagnostic features, and the prognosis are also fully described. As regards treatment, the earlier the condition is attacked, the better the chance of recovery, and cure can be hoped for in simple cases of paraplegia, though, in the spastic variety, treatment is not of much avail.

For the administration of mercury, the oral method should be discarded, and inunctions or intra-muscular injections employed, preferably the latter. Iodide of potassium should be given concurrently in doses of from 4 to 6 grammes; tolerance can usually be obtained by the buccal method, but it was also capable of absorption by the rectum. In spastic paraplegia, instead of vigorous mercurial treatment, injections of biniodide of mercury, in a daily dose of 5 to 8 milligrammes, are recommended, accompanied by other adjuvant measures, such as the actual cautery, faradism, and hydrotherapy.

Abdominal Tuberculosis. By A. E. Maylard, M.B., B.S., Surgeon to the Victoria Hospital, Glasgow. London: J. & A. Churchill. 12s. 6d. net.

The subject of tuberculosis in every shape and form has attracted much attention within recent years, and much of our increased knowledge of the symptoms and treatment of this disease has resulted from the position which surgery has come to occupy in the elucidation of all abdominal affections. It is, therefore, only fitting that this treatise on Abdominal Tuberculosis should come from the pen of a surgeon. That Mr. Maylard is thoroughly fitted for the task, from the large experience of the disease which he has had, may be gathered from the fact that the large majority of the cases, upon which much of the text is based, are culled from his own case-books. Nor does Mr. Maylard deprecate the medical aspect of his subject, and the volume is improved and rendered complete by the addition of a chapter dealing exclusively with the medical side of the subject in its widest and most general aspect.

We cordially commend this volume as a comprehensive and up-to-date presentation of an extremely important subject.

Treatment by Hypnotism and Suggestion; or Psycho-Therapeutics. By C. Lloyd Tuckey, M.D., with an introductory chapter by Sir Francis R. Cruise, M.D., etc. Pp. 418. London: Baillière, Tindall, & Cox. 10s. 6d. net.

Dr. Lloyd Tuckey's work is already well known, and although, as he says, there has been no striking development of hypnotic theory or practice since the 4th edition seven years ago, still we are glad to see a revised and enlarged edition of his excellent work. The author mentions, in several places, how little the subject has been taken up in England compared with what has been done on the Continent. We are, as medical men, very conservative, and have taken a long time to recover from the scepticism, induced by the quackery, which used to be practised by men of no education under the name of science. We quite agree with the author that any form of hypnotism should not be legally allowed to be practised except by qualified medical men. Another point of view is that very few medical men in this country know anything about the subject, and consequently regard it with suspicion, entirely on account of their ignorance. Still another consideration will come in with a few, who are not disposed to send their patients to anyone who practises what they themselves cannot do. They are afraid of losing their patients. Such an attitude is not fair to the patient nowadays, when there are several well-known members of the profession who practise hypnotism, and whose honesty is above suspicion. Years ago it may have been otherwise. Again, many still think that "suggestion" is very liable to do harm, and the author frankly discusses any possibilities in this way, and they are not numerous. Nobody, who is up to date in his medical reading, can now deny that hypnotism must be classed as a therapeutic agent of great value, and, in the hands of a conscientious medical man, no serious harm is likely to follow. The book is very interesting, and contains many references to the writings of the chief workers in England and abroad, while the indications for and against hypnotism in certain cases are freely discussed. Various theories on the subject are reviewed, and many examples are given of cases which were treated by "suggestion."

If this book were widely read by medical men, it would be decidedly to the advantage of both the profession and their patients.

A Simple Method of Water Analysis especially designed for the Use of Medical Officers of Health. By J. C. Thresh. London: J. & A. Churchill. 2s. 6d.

This little work of some 60 pages offers an extremely simple and rapid method of carrying out water analyses, with a minimum supply of chemical apparatus. The reagents, including the various standards, are put up in "soloid" form, and, for the most part, retain their efficiency for long periods. The author, in the short reports on the various samples worked out, very rightly emphasises the necessity in all cases, in addition to the analyses, of personal examination of the sources of supply.

The Immediate Care of the Injured. By Albert S. Morrow, M.D., Attending Surgeon to the Workhouse Hospital and to the New York City Home for the Aged and Infirm; Assistant Attending Surgeon to the Manhattan Maternity Hospital. Pp. 323, and index. 238 illustrations. Philadelphia and London: W. B. Saunders Company.

This book is somewhat more pretentious than is usual in works devoted to the subject of first-aid; though the number of illustrations, and the size of the type used make it appear, at first sight, to contain more reading matter than is really the case.

The author states that he has attempted to make it equally useful to physicians, nurses, and laymen, and, in our opinion, he has, by such ambition, made failure almost inevitable.

The whole is so "scrappy" that it is difficult to imagine that it could be of use to any qualified medical man, and it is equally difficult to think that it would be intelligible to the layman.

The book is divided into three parts: the first sketches the anatomy and physiology of the human body; the second, which is the best of the three, deals with bandages and dressings; and the last is devoted to the treatment of injuries.

When so many books on the subject already exist, it is not easy to see that that now before us fills a gap, or subserves any specially useful purpose.

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Notes by the Way.

The Notification of Tuberculosis.

THE President of the Local Government Board is to be congratulated on the line which he has taken with regard to the "notification" of tuberculosis. The difficulty of bringing this disease under the Act which requires the notification of such diseases as small-pox and diphtheria is obvious, and the objections taken to that course are reasonable. It would be unjust, even if it were practicable, to subject patients suffering from a "chronic" malady which does not, in all its stages, incapacitate them from following their ordinary vocations, to the disabilities which the Act imposes. If the attempt were made to do so, cases would probably be concealed and necessary medical aid rejected. The problem was to obtain the information without applying the Act; and Mr. Burns has discovered that the powers of the Board are already sufficient for that purpose. It is already part of the duties of a Medical Officer of Health to "ascertain the causes, origin, and distribution of diseases within his district, and to inform himself of all influences affecting injuriously the public health." It was therefore only necessary to issue an administrative Order requiring Poor Law medical officers, when called upon to do so by the Medical Officer of Health, to send to him the names and addresses of all parish patients, affected with the disease, within 48 hours of his diagnosis of the case. That, as Dr. Newsholme announced at the Washington Congress, is what is to be done. The notification, of course, will be confidential and extra-legal, and will not arm the Medical Officer of Health with any new powers; but it will not, for that reason, be merely of academic interest. Poor patients do not want to be persecuted, but they do want to be helped; and the advantages likely to result from Mr. Burns' action may be gauged from the facts set forth in the article by Sir William Thompson in our current issue on "Home Treatment and Nursing of Pulmonary Tuberculosis in Dublin." Sir William Thompson gives us particulars of the results of a six months' experiment in voluntary notification inaugurated at the instance of the Hospitals Tuberculosis Committee, formed at the suggestion of Lady Aberdeen. The essence of the report—for the details of which our readers will turn to the article itself—is to the effect that many cases were segregated, which would otherwise have continued to be centres of infection, and that, in other cases, much was done to diminish the danger of infection. The consequence of the Local Government Board Order may be expected to be that what has been done on a small scale in Dublin will now be done on a much larger scale throughout the United Kingdom.

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Imported Meat.

THE latest Local Government Board regulations as to the inspection of imported meat at the port of discharge mark another stage in the long and arduous campaign against avoidable diseases. The subject is one of increasing importance, for we eat more meat than our forefathers did, and procure a larger proportion of it from abroad. Moreover, science has devised many ingenious means of disguising its demerits from the purchaser or other superficial observer, and the risk of eating diseased meat is now known to be more insidious than it was supposed to be even a few years ago. It is no longer merely a question of those outbreaks of ptomaine poisoning, which periodically make night hideous in the cheaper Swiss mountain hotels, or even of the sensational appearance of a few cases of trichinosis. There is also the graver danger of tuberculosis, the bacillus of which malady has discovered that the way to the lungs lies through the intestines, but causes no immediate abdominal pain to warn the individual of its presence. The latest move in the game of the vendor is to baffle the inspector by importing the carcases of pigs from which the lymphatic glands about the throat have been removed, and the obvious—and perhaps the only—answer, was to refuse to receive such carcases altogether. That is what is to be done. Henceforth the importer of such carcases, as well as of certain other scheduled varieties of meat, will be required to re-export them at his own expense, or to "furnish proof in the manner prescribed by the regulations that they are not intended for sale for human consumption." Failing that they will be destroyed. We do not doubt that the result of the measure will soon be perceptible in the tuberculosis statistics.

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The Cholera in Russia.

ANOTHER subject on which the Local Government Board is properly exercising vigilance is the Russian cholera epidemic. It is to be expected, in view of the extent of our trade with Russia, that a few isolated cases of the disorder will occur at British ports; but there is no reason to fear that it will spread, if the port sanitary authorities are on the look-out for it, detect its presence at the outset, and adopt the precautionary measures which experience has shown to be efficacious. That indeed is, broadly speaking, the burden of the circular which the Board has issued to the authorities concerned, and of which copies are, by its direction, to be supplied to Medical Officers of Health. A list is furnished in the circular of the Russian ports at present known to be infected, and it is promised that any further information on the subject which the Board may acquire shall be communicated from time to time. By this means it will be possible for the watchfulness exercised to be special and particular as well as general. A statement of interest as to the supposed origin of the epidemic is contained in a *Times* telegram from St. Petersburg. "Experts agree that it is due to the consumption of tainted food, and especially to the contamination of cold meat by flies." Experts are not always right, and Russian experts are no more infallible than others; but there do seem to be grounds here for supplementing Lord John Russell's (or was it Palmerston's?) advice to the Scotsmen, who desired a day of national humiliation as a preventive of cholera, to "look to the drains" instead. The killing of flies and the inspection of meat may also be recommended as sound practical alternatives to the prophylactic proposals of the famous deputation from Northern Britain.

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Infanticide.

THE circular letter addressed from the Home Office to the persons who have interested themselves in the case of Daisy Lord will not satisfy the more hysterical section of those whom it is hardly an exaggeration to describe as her "supporters." From some of their indignant communications to the Press, one would suppose them to believe that the unfortunate girl had become a mother accidentally, as she might have caught a cold or sprained her ankle, and had committed infanticide either in a fit of absence of mind or for the purpose of drawing attention to the injustices of a social system under which women have to pay the penalty of the faults of men. They have—some of them at all events—written of her as of a virgin martyr, while, at the same time, clamouring for the head of a victim of the other sex. That will not do. It would not do even if the infanticide could identify the partner in her original fault; and the fact that she does not identify him is strong presumptive evidence that she was careless, irresponsible, and promiscuous in her amours. Nor is the fact that the temptation to infanticide is in certain cases a strong reason for leaving it unpunished. It is, in fact, rather a reason to the contrary; for it is precisely where temptation is strong that what moral philosophers call "the legal sanction" is necessary to the maintenance of a high general level of virtue. All that can be said is that the women guilty of this particular crime commit it, as a rule, when in a physiological condition which diminishes their sense of responsibility, and are seldom hardened and irreclaimable offenders. The former circumstance is a good ground for not treating them with the extreme severity which the law metes out, for example, to baby farmers; the latter is a reason for taking special pains to impart a curative character to their detention.

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Educative Imprisonment.

THIS, as the Home Secretary's letter sets forth, is the policy uniformly followed. The commutation of the death sentence to one of penal servitude for life is a matter of form and routine. It applies to all the cases included in a particular category, and the intention is that the particular case shall afterwards be considered on its merits, which cannot be determined until the prisoner has been for some time under observation. So there follows "a longer or shorter period of detention in a convict prison under discipline and with the best training and guidance which can be given by humane officers with special experience of such cases," with the prospect of release, if conduct and the response to good influence be judged satisfactory, at the end of a term not, as a rule, exceeding three years. This, provided that the programme is really carried out in accordance with the intentions of head-quarters, is the most humane and reasonable course that could be adopted, making prison discipline educative and ameliorative in one of those rare types of cases, in which experience has shown that it is possible to do so.

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Holidays.

THOSE of us who have been able to take holidays this year have now returned to work, and can bring the light of experience to bear upon any question that may arise as to the value of vacations in keeping mind and body healthy. A part of our own holiday was spent in reading a book by a French physician —Dr. Toulouse, if we remember rightly—who maintained that holidays did more harm than good, and that we could perfectly well stick to our work all the year round without interruption. Very likely we could, if certain conditions could be guaranteed: if the circumstances of the work were hygienic, if we were thoroughly interested in it, if we never worked under high pressure, and if we took mild, regular exercise. But those conditions are very seldom present, and it is precisely on their absence that the case for holidays depends. The number of men, in a position to decide for themselves exactly how hard they will work, is very small indeed; and they, working because they like it, are specially liable to work longer hours than are good for them. They need, therefore, just as much as the others, to be dragged away from their desks and sent out into the fields with golf clubs, fishing rods, ice-axes, or other sporting implements in their hands. Even if they resent the change of occupation at first, it will do them good. They will get to like it in the course of a day or two, and the more they like it, the more good it will do them. A defence of holidays, indeed, if other defences were wanting, might be constructed on the same lines as Matthew Arnold's famous defence of wine. "Wine," said that great thinker, "adds to the enjoyableness of life, and whatever adds to the enjoyableness of life adds to its richness, and fulness," etc. The aphorism is not perhaps one fit for absolutely universal application. It does certainly seem to lend itself to abuse on the part of a voluptuary. But we may apply it, in moderation, to holidays without any fear of the consequences.

Practical Notes.

ANGULAR CONJUNCTIVITIS.—This form of subacute, or chronic conjunctivitis, frequently occurs in children of the poorer class, especially in those attending school, and is readily spread from one to the other by the indiscriminate use of a handkerchief common to many. The disease, which is contagious, is due to the Morax-Axenfeld diplo-bacillus, and is characterised by a catarrhal inflammation of the ocular and palpebral conjunctivæ; the superficial vessels of the conjunctiva are dilated, the caruncle is swollen and red, the plica semilunaris is congested, and from the conjunctival sac there is a slight mucous or muco-purulent discharge. As a rule, the corneal epithelium remains intact, and there is no tendency to corneal ulceration. Not infrequently there is a muco-purulent discharge from the vestibule of the nose, and it is quite possible that this is the primary source of infection, and that the involvement of the conjunctival sac is secondary. The condition usually becomes symmetrical. The disease is advantageously treated by zinc salts, and the following lotion will be found to be useful:—

℞	Acidi Borici	g. viij.
	Zinci Sulphatis	g. ij.
	Aq. Dest. ad	℥i.

Fiat. Collyrium.

This lotion should be diluted with an equal part of water, which has been previously boiled, and used *warm* to the conjunctival sac, and particularly to the inner canthus, four or five times daily. After bathing the eye at night, a drop or two of protargol, 15 per cent. or 20 per cent., should be placed in the inner conjunctival angle. If there is a tendency for the eyelids to stick together during the time the patient sleeps, a small piece of ointment, preferably unguentum acidi borici, diluted with an equal part of paraffinum molle, should be smeared along the margins of the eyelids. The nostrils should be carefully examined, and if there is any sign of a muco-purulent discharge from this region, they should be carefully washed out with soap and water, and, when quite clean, a piece of unguentum zinci should be smeared well over the vestibular walls. This should be done every night, until the nostrils and vestibule of the nasal cavities appear quite clean. The child should clear its nose into a piece of clean old calico or linen, which should be burned at once; any material used to wash out the eyes should also be at once burned. Towels and handkerchiefs, used by the patient, should be kept absolutely for that patient alone, and, when soiled, they should in all cases be *boiled* at once, and not allowed to become dry before they are washed. As far as is possible, the patient should not be allowed to mix with other children, and those, whose duty it is to care for the child, must take particular precautions in order that their own eyes may not be infected.

FOREIGN BODIES IN THE NOSE.—Children are very apt to introduce foreign bodies into the nose, and those more commonly found are pieces of slate pencil, fruit stones, boot buttons, indiarubber, etc. These may be retained, especially if existing in one nostril only, and may cause local inflammation, followed by ulceration, and consequently by a unilateral, purulent nasal discharge, oftentimes very fœtid. If the foreign body is just within the anterior naris on one side, it may be expelled by first pressing over the other naris, so as to occlude it, and then telling the child to blow down the nostril which contains it. The foreign body usually lodges in the anterior third of the inferior meatus of the nose, and it is very difficult to obtain a good view of it. If forceps are applied to it, it usually slips away and gets further along the meatus. By far the best way of removing such a foreign body is by applying over it a Strabismus hook. Dr. Lambert Lack writes that "the hook is gently passed through the middle meatus of the nose, over and beyond the foreign body, which almost always lies in the anterior third of the inferior meatus; its point is then lowered on to the floor of the nose, and it is drawn gently forward. With care the hook can usually be placed in position without frightening or hurting the child, and then, even if the child draws backward, it only helps the removal of the foreign body. If this manœuvre is unsuccessful, or if the child is very frightened, a little chloroform may be given, and the removal attempted in the same way." It is not wise to attempt the removal of a foreign body from the nose by syringing, for the fluid used may be forced up the Eustachian tube into the middle ear, the result of which is an attack of otitis media.

FOREIGN BODIES IN THE EAR.—Living insects occasionally make their way into the external auditory meatus, and produce a great deal of local irritation and discomfort. If the insect is clearly seen through the aural speculum by means of reflected light from a hand-mirror, the head of the patient should be placed on one side, and the meatus filled with a little chloroform vapour. The insect may then come out of its own accord, or it will be killed, when it may readily be removed by syringing.

Occasionally hard foreign bodies are introduced into the external ear, such as fruit stones, matches, and the end of a pointed penholder, which may break off and remain *in situ*. Foreign bodies should be removed from the ear by syringing, which should be done under strict aseptic conditions. The syringe should be of one ounce capacity, and should have been just previously boiled, or immersed in a solution of 1 in 20 carbolic acid. The water used for syringing out the ear should have been previously boiled and used while warm. The patient should be seated opposite a window, with a good light falling upon the ear to be syringed. The auricle should be gently drawn downwards and backwards in a child, upwards and backwards in an adult. This manœuvre is essential, in order that the external auditory meatus may be made as straight as possible. The nozzle of the syringe should be placed just inside the external auditory meatus, and the warm water projected along the upper and back wall of the meatus in a slightly jerky manner. This process may be repeated over and over again until the foreign body is expelled. Rough attempts at removal by means of forceps, hooks, etc., may lead to complications, such as injury to the meatus, rupture of the membrana tympani, loss of the ossicles, facial nerve paralysis, and even meningeal complications.

FOREIGN BODIES IN THE CONJUNCTIVAL SAC, IN THE CORNEA, AND IN THE SCLERA.—If a patient suddenly develops acute conjunctivitis in one eye only, accompanied with lachrymation, the conjunctival sac should be carefully examined for the presence of a foreign body. The cornea and sclera should be inspected in a good light. The lower lid may be then drawn down and its inner aspect examined, the upper lid should then be gently everted, and, if no foreign body is then seen, the retrotarsal fold should be inspected. Foreign bodies, such as dust, may be readily removed from the conjunctival sac by applying to them the free margin of a clean piece of blotting paper. The eye should then be washed with warm boric acid lotion, the strength of which should be 5 grains to the ounce. If the foreign body is embedded in the cornea, or in the sclera, the surface should be anæsthetised with a four per cent. solution of cocaine hydrochloride, and the foreign body carefully removed with a sterilised spud or needle. Great care must be taken in order that the surrounding tissue may be damaged as little as possible. Sometimes a little brown stain is left in the cornea after a piece of hot iron or emery has been removed: this stained surface should be removed as far as is possible.

After the foreign body has been removed, the eye should be washed with warm boric acid lotion, and a drop of atropine sulphate solution, of a strength of 2 grains to the ounce, should be instilled into it, and then a firm pad and bandage should be applied. This may, as a rule, be removed after the lapse of 24 hours.

PRURITUS ANI.—There are many causes of itching about the region of the anus, but those more frequently found are as follows:—Local sweating, dirt, pediculi, eczema marginatum, condylomata and piles; though the condition may be due to chronic constipation, the presence of worms in the rectum, polypi, fissure, or other rectal disease. Mr. Wallis has pointed out that the pruritus may be due to excoriation in the anal canal, producing hypertrophy of a fold of mucous membrane scarcely amounting to a fissure; this is usually found to exist on the posterior aspect of the gut.

In all cases, before any treatment is advocated, the anal canal and rectum must be carefully inspected, in order that an existing cause may be recognised and removed. The region must be kept scrupulously clean, the parts should be washed twice daily, and always after an action of the bowels, with soap and warm water, applied with a soft sponge or cotton wool; and, after drying, a little boric acid powder may be applied. The following ointment, recommended by Mr. Lockhart Mummery, will give relief in many cases, especially if applied at night:—

℞	Hydragyri Subchloridi - -	ʒij.
	Bismuthi Subnitratis - -	ʒiss.
	Tincturæ Aconiti - - -	♏viij.
	Glycerini - - - -	ʒij.
	Unguenti Sambuci - - -	℥j.

Misce. Fiat Ung.

Sir William Whitla says there is no better remedy than the official Unguentum Conii, which is generally found to act very rapidly. If local astringents are required, such drugs as Lead, Tar, Camphor, or Phenol may be combined with the conium ointment. The conium appears to paralyse the sensory nerve terminals in the skin and mucous membrane around the anus.

NORMAL SALINE INFUSION AND CHLOROFORM.—Burkhardt has carried out researches in this subject, and comes to these conclusions:—When an infusion is given shortly before narcosis, the toxic action of chloroform upon the organism can be essentially reduced. This effect is thus explained by virtue of the dilution of the blood, the coefficient of absorption of chloroform in the blood is lower, and the blood-pressure, in consequence of this, falls much less. The vagus also after the dilution remains more sensitive. By previous dilution, the concentration of chloroform, fatal at other times to the organism, can without harm be considerably exceeded. The infusion must be given as shortly as possible before the operation, and must be as copious as possible; the greater the dilution, the more intense the effect. Besides the small decrease in the blood-pressure, owing to a previous infusion, the quick recovery after narcosis is particularly remarkable. The chloroform is more quickly excreted again by the respirations. Then again the troublesome after-effects, like headache and vomiting, are very slight or altogether absent.

Preparations and Inventions.

ARSACETIN AND SABROMIN.

(London: Messrs. Meister, Lucius & Brüning, Ltd.)

Arsacetin, or sodium p-Acetyl-aminophenylarsinate-acetylarsanilate is a white powder containing three or four molecules of water of crystallisation, and easily dissolves in cold water to the extent of 10 per cent. and in hot water up to 30 per cent. It is free from any arsenious and arsenic acid, and it withstands boiling.

Experiments upon animals, such as the ape, show that Arsacetin is less toxic than arsanilate, and therefore will be found to be of considerable value where energetic treatment of parasitic diseases is desired, and especially in such diseases as trypanosomiasis, syphilis, etc.

Sabromin is the calcium salt of dibromobetrenic acid. It is a white powder, insoluble in water and alcohol, and has the advantage of being tasteless and odourless. If heated on platinum foil, bromine is liberated. It is used as a substitute for potassium bromide, and does not tend to produce the symptoms known as bromism. Experience has shown that 15 to 40 grains may be taken daily. The specimen submitted to us consists of tablets, each containing 7½ grains, which may be readily swallowed whole with a little water.

SILCOOL.

(Cheltenham: Mr. Thomas Heard, Albert House, Regent
Street, Cheltenham.)

Silcool is a form of vegetable silk-wool which has been introduced specially for the purpose of stuffing mattresses. It is a very light, clean, soft wool, and does not absorb moisture, and, in this respect, is particularly suitable for the bedding of bed-ridden invalids and young children. It has distinct hygienic advantages over the usual material employed in mattresses of the ordinary type, and we judge it to be a very useful production.

THE PRACTITIONER.

DECEMBER, 1908.

TWO CASES OF MULTIPLE CONGENITAL DEFORMITIES.

BY SIR GEORGE THOMAS BEATSON, K.C.B., M.D., C.M., B.A.,
Surgeon to the Glasgow Western Infirmary, and to the Glasgow Cancer Hospital.

[With Plates XXIII. and XXIV.]

PROGRESSIVE as ante-natal pathology has been of late years it has still many unsolved problems to deal with, and it has also to justify and establish some of the views it has put forward in explanation of deformities found in the newly born. Instances of the latter are furnished by such congenital malformations as constrictions, deficiencies of parts, and certain forms of club-foot, for a good deal of dubiety still attaches to the exact causation of these affections. Hence, cases of this kind have always an individual interest, and especially so when all the above three conditions are found side by side in one infant, who is in all other respects physically and mentally healthy. This is not I think of very common occurrence, for the cases that have been recorded, in which the above three abnormalities have existed in combination, have generally shown other deficiencies, such as an absence of the cranial vault with encephalocele, hydrencephalocele, and, occasionally, anencephaly. In fact a perusal of these published cases show that they have a great family likeness in the number and character of their defects. Such a multiplicity of deficiencies militates against a successful study of their ætiology, and does not make them altogether a safe guide in explaining single lesions, so that a more favourable field of study is presented by cases where the children are otherwise well formed though affected by certain malformations of a limited and definite type. It is this that has led me to put on record the two following cases, which show a triple combination of congenital defects occurring in the same individual, viz.:—

(1) Constrictions of legs, arm and fingers;

(2) Apparent absence of portions of toes and fingers; and

(3) Club-feet.

The first case I would draw attention to is that of a young girl, aged 19, who consulted me about a deformity of her feet which incommoded progression and interfered with the comfort of bicycling. Fig. 1 shows the deformity of the feet and also displays a number of other very remarkable conditions. Both feet it will be noticed are small and in a position of marked equino-varus. The right foot has all the toes represented, but the third, fourth, and fifth are better developed than the great and second toes, which are ill-formed, having no nails on them and possessing apparently only one phalanx each. The left foot has also all its toes represented, and they are provided with nails, but the fourth and fifth toes are rudimentary. The left leg at its lower part has a very marked double constriction, the bands being about three inches apart with the intervening portion swollen and discoloured and the seat of "chilblain." It will be noticed, too, that the hands exhibit certain deficiencies. These are shown in Fig. 2. All the fingers of the right hand are normal save the middle one, which has apparently only the first phalanx and has no nail, while near its point there is a slight constriction. In the left hand all the fingers are stunted, the thumb alone being well developed. The terminal phalanx and nail of the forefinger are absent, and there is a constriction near its point, while in the middle finger, although its terminal phalanx is wanting, the nail is present. The ring finger resembles the forefinger, but the constriction at its point is more marked. The little finger seems in every way normal.

When this first case came under my notice I confess I regarded it as very uncommon, for I had never before seen in a healthy person such a combination of malformations, and I could only find one similar case recorded. It was that of a boy, shown by Dr. Hubbard, in November 1896, at the meeting of the Pediatric section of the New York Academy of Medicine, suffering from club-feet with absence of toes and fingers and with constriction bands of leg and finger. Recently, however, I was consulted in the case of a male infant, aged 7 months,

PLATE XXIII.

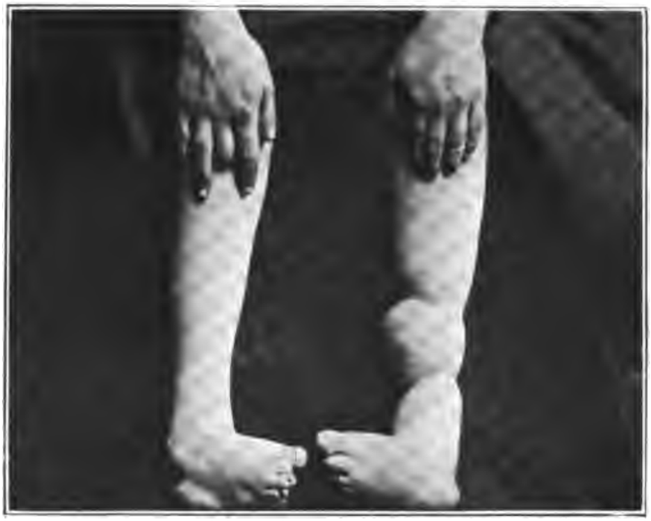

Fig. 1.

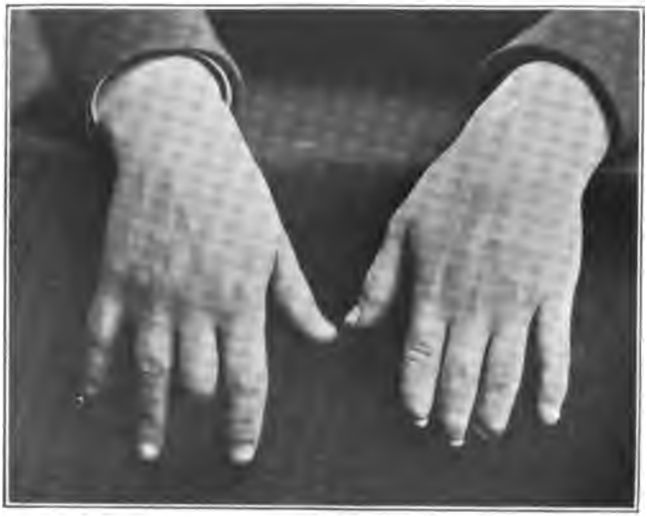

Fig. 2.

PLATE XXIV.

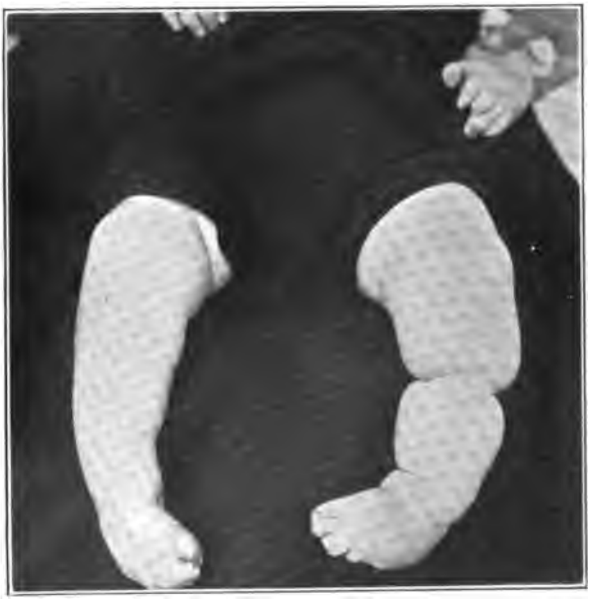

Fig. 3.

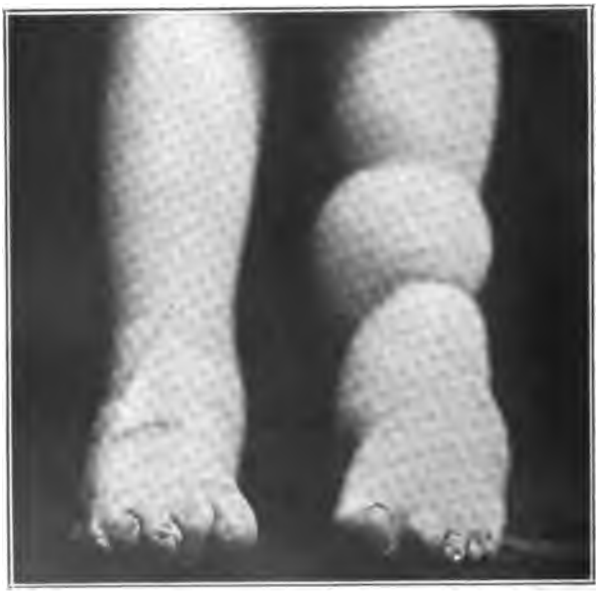

Fig. 4.

as to whether anything could be done to correct a deformity of its feet. When examining them I was interested to find present certain other congenital malformations not unlike those described in my first case. They are seen in Fig. 3. Both feet, it will be noticed, are in the condition of equino-varus, and in the left leg, a short distance below the knee, there is a tight circumferential fibrous constriction completely round the leg. Just above the ankle in the same limb there is a slighter constriction on the inner side, and, at a slightly higher level on the outer side, there is another constriction not completely round the leg and not seen in the photograph. In the right thigh there is a constriction on its inner side just above the knee. The right foot shows complete fusion of the second and third toes with no demarcating sulcus, but a definite double nail. The third and fourth toes are partially fused, with a distinct separation at their distal ends, and on the inner aspect of the second toe there is an enchondrosis. The left foot shows fusion of the third and fourth toes similar to that of the second and third toes of the right foot and with distinct nails. Fig. 5 shows the condition of matters in the upper extremities. On the inner side of the right arm, just above the elbow, there is a constriction band, and in the right hand at the terminal phalanx there is an enchondrosis of the ring finger which prevents flexion, except to a slight extent. In the

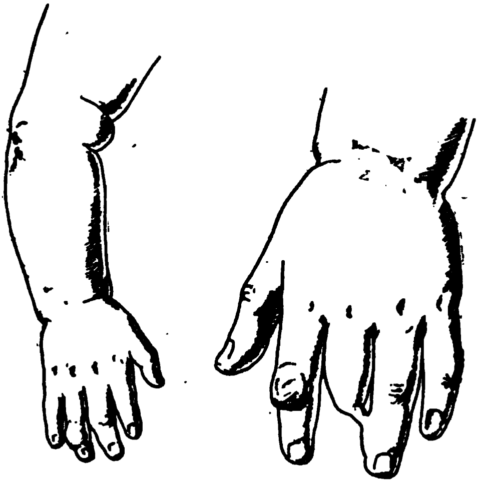

Fig. 5.

middle finger of the same hand there is a slight thickening of the second phalanx. The left hand shows a marked enchondrosis of the index finger with a partial fusion of the middle and ring fingers, the middle finger fusing at its tip (represented by the second phalanx) through the medium of a narrow fleshy union, which is attached to the ring finger just below the terminal phalanx. The middle finger has apparently no terminal phalanx and no nail.

I think it is clear from the descriptions given of these cases that they resemble one another in their essential features, and that they are alike in the abnormalities being present at birth, in their being confined to the extremities, and in their occurrence in children otherwise well-formed and healthy. Undoubtedly they possess many points of interest, but the two outstanding ones are (1) the exciting cause of the defects, and, (2) how far such cases are amenable to the ordinary surgical treatment of club-foot. It is on these two I propose to make a few remarks.

Consideration of the exciting cause of congenital defects brings us face to face with the abstruse and difficult problems of teratology, that is the science of those malformations and monstrosities which occur in both the vegetable and animal kingdoms. In the study of teratology, the modern view is that we must recognise three periods of ante-natal life—the germinal, the embryonic, and the fœtal. All vary in length, the fœtal being the longest, and each has its own special work and characteristics. That of the germinal is cellular activity forming the blastocyst, that of the embryonic is constructive with differentiation of cells and consequent formation of tissues and organs, that of the fœtal is the growth and increase of the completely formed embryo. In each of these periods pathological influences may be at work, and so we may have in each of them an explanation or cause of congenital malformations. With the germinal period is intimately bound up the question of heredity, and it cannot be denied that through spermatozoon or ovum there may be transmitted characteristics that impress themselves on the cells of the blastodermic vesicle before ever the embryonic area has appeared. We are all conversant with cases of hereditary hare-lip, polydactyly, and other conditions that can only be satisfactorily explained by this factor of heredity. This latter will not, however, meet all the cases of abnormality that occur, and the modern view is that the determining conditions that give rise to congenital defects are to be referred to the embryonic period more than to the fœtal. This last has its pathological affections, but they take the form more of failure of nutrition and are placental in origin, being due to diseases transmitted through that structure. In short the whole trend of the ante-natal pathology of the present day is to discard nosological influences in connection with teratology, and to assign it to disturbances in embryology, in other words to regard teratology as embryology in disorder. (Ballantine). In support of this view a great deal of evidence has been collected to show that the amniotic environment is largely responsible for pathological processes, and that amniotic adhesions and pressure are the disturbing agents. From this it follows that the causation of malformations and monstrosities is no longer assigned to maternal impressions, to defects in the male and female generative elements, or to fœtal diseases, but to defective embryological processes and to mechanical pressure, not so commonly external as internal and intra-uterine, especially from the amnion and amniotic adhesions.

Applying this pathology to the present cases there are facts that are in favour of such a view. Taking first the club-

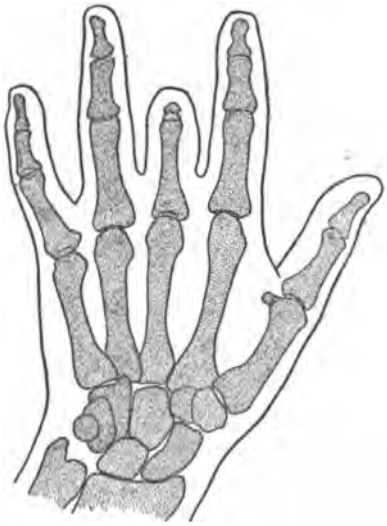

Fig. 6.

feet, it is probable that R. W. Parker's explanation of this condition is correct, and that it arises from mechanical causes due to malposition or compression of the fœtus in utero, the intra-uterine packing retaining the feet in one position which becomes fixed. If this happens in connection with the fœtus, its possibility must be permitted in the embryonic period, when pressure may make itself felt to the extent of causing constrictions or of interfering with the normal processes of development either generally or partially. That the deformity of the middle finger of the right hand is not due to amputation but to a defective formative power is shown by Fig. 6, which is a sketch of a skiagram of the hand. Examination of it shows the presence of both of the apparent absent phalanges in a condition of retarded development, a state of matters incompatible with intra-uterine amputation. That intra-uterine amputation may occur and has occurred, must, I think, be admitted, but it is not the solution of all deficiencies of parts, nor must all congenital grooves be put down to external constricting agents. I consider that it is quite possible to have grooves formed by the umbilical cord even during the fœtal period of intra-uterine life, but I can also understand them as arising during the embryonic period from pressure and from temporary defects in formative power, so that I believe the best course, in our present state of knowledge, is to recognise that pressure interfering with the developmental processes of the embryonic period is the most common exciting cause of malformations and monstrosities, and that other factors such as heredity and funicular twistings may be responsible for them as well, the history of the other conditions present determining the class to which each case must be assigned.

Passing now to the question as to how far such cases as these that I have recorded are amenable to the ordinary surgical treatment of club-foot, I think the first case gives useful help. I learnt from the girl's mother that the surgeons she had seen, before coming to me, were against any operative measures, as the poor circulation in the feet indicated some interference by the constrictions with the blood supply. The tendo Achillis on each side had been divided, but nothing more had been done. I quite recognised the reasonableness of the opinion that had been expressed as to operation, and as nothing but tarsectomy could improve the condition of the feet I had some hesitation in acting in opposition to it, but observation of the case for a period was favourable to the performance of some form of tarsectomy, and I removed the astragalus and cuboid in each foot, but at different times. Fig. 4 (Plate XXIV.) shows the result, which was in every way satisfactory, and the patient's condition and comfort since have been immensely improved. The treatment of the second case is being conducted on the lines I always follow in treating congenital club-foot, viz., of varying it with the age of the patient. In infants I trust largely to manipulation, dividing any specially resistant structures, and using splints. In slight cases, and with treatment commenced early, good results are usually obtained by this method. In more severe cases, I generally divide all resisting structures by Phelp's open method on inner border of foot down to and including the astragalo-scaphoid articulation and capsule, and then I put the feet up in splints, being careful to over correct as much as possible the varus deformity. When the wounds are healed, I employ the aid of artificial muscles on Phelp's plan. Subsequently, should the result not be all that is desired, and sometimes it is not, as a certain amount of relapse happens when the child begins to walk, then I perform some variety of tarsectomy, either excision of astragalus or removal of a wedge-shaped portion of bone from the convexity of the foot. Upon these lines treatment will be carried on in the second case. Division of the tendo Achillis has been done, and already, by the aid of regular manipulation and the use of splints, considerable improvement is manifest, so that I hope in the end a good result may be obtained.

THE PATHOGENESIS OF ARTERIO-SCLEROSIS.

By E. H. COLBECK, B.A., M.D., F.R.C.P.,

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THE increased attention, which has been directed in recent years to the clinical study of the peripheral circulation, is, no doubt, largely attributable to the introduction of mechanical appliances for the measurement, and incidentally the registration of blood-pressure. Although the sphere of usefulness of these instruments has not yet been fully determined, it is abundantly clear that they have more than justified their present position among clinical armamentaria, not only by reason of the large mass of valuable information which their employment has furnished in reference to blood-pressure in its physiological aspects, but also on account of the remarkable stimulus which their use has given to the investigation and elucidation of arterial disease. The interpretation of the blood-pressures recorded by the hæmomanometer, under pathological conditions, will come under review in the course of the development of the argument which forms the subject of this paper. A clear conception of the various morbid processes that may affect the arterial wall has been greatly hampered and obscured by the terminological confusion, which has arisen in connection with the presentation and comparison of pathological and clinical observations on vascular disease. The practical outcome of the use of this disordered nomenclature is the difficulty experienced in the recognition and differentiation, from the clinical standpoint, of the pathological changes described under the terms atheroma and arterio-sclerosis. It is, however, unnecessary to elaborate this point, since, in the light of the comparatively recent work on arterial disease by Russell, Savill, and others, the meaning of these terms can be clearly and unambiguously defined.

Atheroma is a purely focal affection of the arterial wall. It is characterised by a discrete, patchy, fibrous hyperplasia of the sub-endothelial connective tissue, with the production of localised thickenings of the tunica intima, which are prone to undergo degenerative changes. The effects of atheromatous disease are seen in the narrowing of the lumen of the affected vessels, and in the weakening, bulging, and distortion of the arterial walls. The arteries most commonly affected are the aorta, the larger systemic and cerebral vessels, and the coronary arteries. Arterio-sclerosis, on the other hand, consists in a more or less uniform thickening of the whole circumference of the arterial wall along considerable stretches of the vessel, and usually, though not necessarily, over a large vascular area. It is characterised by (*a*) a thickening of the tunica intima (intimal sclerosis), due to the hyperplasia of the sub-endothelial connective tissue, (*b*) a thickening of the tunica media (medial sclerosis), due to hypertrophy of its muscle fibres, (*c*) in occasional instances a thickening of the tunica adventitia (adventitial sclerosis), due to hyperplasia of the connective tissue immediately surrounding the artery. The thickened tissue has little, if any, tendency to undergo degenerative changes, and it chiefly affects the medium-sized and smaller arteries.

The description of arterial sclerosis, that has just been given, is, to all intents and purposes, the one put forward by Russell, and it will be adopted in this paper, since it is by far the most satisfactory and scientific exposition of the subject with which we are acquainted.

It will appear, therefore, that atheroma and arterio-sclerosis are two totally distinct morbid processes, and this can be demonstrated, not only as regards their mode of origin, but also in respect of their area of distribution, and of their ultimate effects on the arterial walls and circulation. It, no doubt, occasionally happens that atheromatous changes become grafted on to arterial sclerosis, and, in this event, the effects characteristic of each morbid process are statically and dynamically represented in the vessel or vascular area that is affected.

The mode of origin of arterio-sclerosis has given rise to a great deal of interesting speculation, but it cannot be said that a satisfactory solution of the cause of the arterial thickening has yet been afforded. Until the appearance of Russell's work on "Arterial Hypertonus, Sclerosis, and Blood-pressure," the hypothesis, that has met with most general acceptance, was advanced by Thoma, who regarded the sclerosis as compensatory to slowing of the blood-stream consequent on dilatation of the vessels. It seems hardly possible to maintain Thoma's views in the face of the adverse criticism to which they have been subjected by Russell, and this writer has put forward another explanation, to the effect that the thickening of the intima is the result of long-continued irritation of its tissue by substances present in the blood.

It will be argued that neither of these assumptions can be sustained, and the attempt will be made to show that arterial sclerosis has its origin in absolute, or relative over-stimulation and functional exhaustion of the middle or muscular tunic of the arterial wall. Some years ago,[1] the writer endeavoured to demonstrate that all forms of fibrous hyperplasia originate in increased nutrition, consequent on the partial or complete loss of control that is normally exercised over the nutritional supplies to the fibrous tissue by the more highly specialised cells with which it is associated.

This proposition has not been seriously disputed, and it will be contended that arterial sclerosis, in common with other forms of fibrous hyperplasia, owes a similar mode of origin.

The evidence in support of the view that has just been advanced is derived mainly from histological and clinical considerations, which require a somewhat detailed examination.

The most noteworthy feature about arterial sclerosis, from the histological standpoint, is the remarkable diversity in the morbid appearances as described and depicted by different observers. Thus, Sir George Johnson, a pioneer among workers in the field of arterial disease, discovered a generalised hypertrophy of the muscular coat of the arteries in association with granular kidney. Gull and Sutton, on the other hand, emphasised a widely-spread intimal thickening, to which they gave the name "arterio-capillary fibrosis." Subsequent observers, among them Rosenstein, Ewald, Dickinson, and West, gave a more or less modified acceptance to both these sets of changes, and laid stress on the one or the other in accordance with their views on the relationship between heart and kidney disease. During the last ten years, Savill has repeatedly urged the importance of the recognition of a generalised increase in the muscular tissue of the arteries, to which he applies the term arterial hypermyotrophy, as a pathological and clinical entity.

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[1] "The Pathogenesis of Fibrous Hyperplasia," *Lancet*, 1901.

This observer also describes intimal and adventitial thickening in association with arterial hypermyotrophy. A reference has already been made to Russell's work on "Arterial Hypertonus, Sclerosis, and Blood-pressure," wherein he deals exhaustively with the whole subject of arterial sclerosis. Russell concludes, as the result of his histological investigations, that arterial hypermyotrophy is almost invariably associated with some degree of thickening of the tunica intima, and occasionally with thickening of the tunica adventitia.

A comparison of the observations that have just been quoted clearly and unmistakably brings out the absence of uniformity which characterises the morbid appearances that are found in connection with arterial sclerosis. Thus, while arterial hypermyotrophy and intimal sclerosis are usually found combined in various proportions, either the one or the other lesion may, and not infrequently does, dominate the pathological picture. It is noteworthy, however, that high degrees of medial and intimal thickening seldom, if ever, occur together. In view of the absence of uniformity, in conjunction with the correlation of the morbid changes in arterio-sclerosis, it is suggested that they represent stages in the operation of a single pathogenetic process, which commences with increase of function and consequent hypertrophy of the arterial muscular coat, progresses by way of failure of functional efficiency with degeneration of the muscular substance, and culminates in hyperplasia of the fibrous tissue elements of the arterial wall.

The first step in the production of arterio-sclerosis is an increase in the functional activity of the musculature of the arteries and arterioles, whereby their usual tonus is augmented. The means by which this arterial hypertonus is effected, whether through alteration in the composition of the blood, or through nervous agency, or through both these influences, has not yet been fully determined, and the discussion of the problem hardly comes within the scope of this paper. It is sufficient for our purpose to recognise the well-authenticated clinical observation that arterial hypertonus may occur at any age, but is more especially obtrusive during and after middle life. Now, long continued, or recurrent hypertonus, be it of the heart or vessels, leads, under favourable nutritive conditions, to muscular hypertrophy. The extent and duration of the arterial hypermyotrophy depend, no doubt, on the extent and duration of the cause, and on the functional capacity of the muscular tissue of the individual. Between failure to react to the demand for increased activity, and the highest possible expression of functional capacity, there must be every gradation of muscle response.

In any circumstances, a time comes when the muscle fails to respond to heightened functional activity and increased nutritive supply in the shape of hyperæmia, owing to the inherent limitations for growth, that are imposed on muscular, in common with other highly specialised tissues. Now, failure to respond implies protoplasmic insufficiency and ultimately degeneration, and it is not unreasonable to assume that one of the effects of the functional inefficiency of the muscular, and, in this case, of the master tissue is an inability to deal with, and control the food supply, whereby increased nutritive opportunities are afforded to the associated fibrous tissue, which thereupon proliferates. Moreover, it is not unreasonable to assume that the failure of the muscle cells to respond to the call for increased functional activity is in itself a stimulus to further augmentation of the blood supply. The overgrowth of fibrous tissue must, of course, be proportional to the increased nutritive opportunities that are afforded, but there seems to be no reason why it should not proceed indefinitely, were it not that the newly formed tissue tends to contract, and thus to cut off its blood supply.

The working of the pathogenic process, that has been assumed here, would therefore give rise, under favourable conditions, to arterial hypermyotrophy which, though it may be maintained unimpaired for long periods, tends in course of time to be followed by intimal hyperplasia. On the other hand, in the event of the arterial musculature failing wholly or partially to respond to the stimulus for increased functional activity, intimal sclerosis would be the initial and dominant lesion. Between these extremes, the correlation of arterial hypermyotrophy and intimal sclerosis would be subject to every possible gradation. In this connection, it is interesting to note that Savill, in the course of his histological investigations, "has met with many cases in which it could be legitimately inferred that chronic adventitial and intimal sclerosis of the larger and medium-sized arteries has been secondary, both in time and importance, to changes in the media." Adami too has pointed out that certain cases of endarteritis, associated with fibrous thickening of the intima, are more than probably due to increased nutrition.

In view of the arguments that have been adduced, it is clear that the occurrence and diversity of the histological changes in arterio-sclerosis can be fully and completely accounted for through the operation of the morbific process that has been assumed in this paper.

Thoma contends that, in arterio-sclerosis, there is a primary degeneration and yielding of the tunica media, so that the arterial lumen is widened, and the blood-current slowed. The intimal hyperplasia he regards as an adaptive reaction, which restores and maintains the original lumen of the vessel, and thereby re-establishes the circulatory equilibrium. In a large proportion of the cases of arterio-sclerosis, clinical experience distinctly negatives any initial weakening of the media and consequential dilatation of the vessels. Moreover, were the intimal thickening, described by Thoma, compensatory to the widening of the arterial lumen and slowing of the blood-current, it ought to cease with the restoration of the circulatory equilibrium. Histological observation shows that intimal hyperplasia not only does not stop at this stage, but may go on to complete arterial occlusion.

The weakness of Thoma's argument appears to be, that it shows too great a dependence on pathological, as compared with clinical, considerations, and therein it tends to divorce the statical from the dynamical conditions of the circulation.

Russell ascribes arterial hypertonus and arterial hypermyotrophy, as well as intimal hyperplasia, to the same cause, which is the action of irritating substances present in the blood. In this event, the relation between the medial and intimal changes ought to be fairly constant, but, even on Russell's showing, this is not the case. Nor, in Russell's view, is it possible to satisfactorily explain the occurrence of arterial hypermyotrophy, or intimal hyperplasia, as an isolated lesion in arterio-sclerosis. Moreover, it is questionable whether a so-called irritant could act at one and the same time as a direct stimulus to the functioning and vegetative side of cell-life, producing, in one case, increase of function, and, in the other, growth.

Arterial sclerosis, in its clinical aspects, has excited an unusual degree of attention, inasmuch as it involves problems of the highest interest and importance. The question which has given rise to the greatest amount of controversy is the relation between the blood-pressure readings, as recorded by the hæmomanometer, and the arterio-sclerotic changes.

A detailed consideration of this side of the subject does not come within the scope of this paper, and it must suffice to state a few general propositions, which bear on the main argument. In the first place, it may be safely asserted that, whatever may be the part that arterial hypertonus plays in the initiation of increased blood-pressure, it is certainly an essential factor in its maintenance. Again, it must be borne in mind that arterial hypertonus is exhibited, as Russell insists, by sclerosed, as well as by normal vessels, and the bearing of this clinical fact in relation to blood-pressure must possess considerable and far-reaching significance. Furthermore, even in the advanced stages of arterio-sclerosis, the enfeebled arterial musculature must still take a share, though it may be a small one, in respect to the maintenance of blood-pressure.

Allbutt urges that there is no direct relation between arterio-sclerosis and arterial pressures, and if the arguments advanced have any weight they clearly lend support to this contention. They also admit and explain the possibility of either high or low blood-pressure, so far as the arterial side of the question is concerned, in association with arterio-sclerosis, a clinical observation on which Allbutt insists. In this connection, it is interesting to observe that, so far as the purely sclerotic changes are concerned, the foregoing arguments support the contention, in direct opposition to the view of Von Basch, that arterio-sclerosis is the result rather than the cause of increased blood-pressure.

For Russell, the condition of the arterial wall is the main factor in the production of the high hæmomanometer readings that are obtained in arterio-sclerosis. It is hardly open to question that hypertrophied muscle in a state of hypertonic contraction could fail to offer resistance, and considerable resistance, to compression by the air-bag of the hæmomanometer. Yet Russell, curiously enough, has apparently overlooked the fact that the presence of muscular excitants in the blood would probably affect the cardiac tonus as much as the arterial tonus. If this is so, it is not unreasonable to surmise that, in the absence of depressor readjustment, the arterial pressures are set high, so to speak, wherein may lie one of the difficulties that is experienced in lowering high hæmomanometric readings by treatment. At the same time, an important contribution in support of the correctness of Russell's view on high hæmomanometer readings may be permitted. Savill states that arterial hypermyotrophy is nearly always more marked in the vessels of the lower as compared with those of the upper extremities. My friend and colleague, Dr. O. K. Williamson, tells me that his observations (taken, of course, at the level of the heart), so far as they go, show quite definitely a higher hæmomanometer reading (in high pressure cases) for the vessels of the leg than for those of the arm. The only variable factor seems to be the degree of thickness of the vessels in the two situations, and, if these observations can be confirmed, they would go a long way to establish Russell's position.

The relation between granular kidney and the cardiovascular changes which accompany renal disease still remains for consideration. In the light of the hypothesis that has been advanced, the elucidation of this association becomes an extremely simple matter. As Allbutt, Russell, and others have pointed out, there are two kinds of renal sclerosis, which, for purposes of distinction, may be called the granular and the fibrotic kidney.

The granular kidney is the result of functional inefficiency and degeneration of the renal epithelium, with consequential failure to control the food supplies to the fibrous stroma of the organ, which thereupon proliferates. The renal vessels must, of necessity, become involved from the outset in the connective tissue hyperplasia. The fibrotic kidney is part of a generalised arterio-sclerosis, which affects the renal vessels in common with the other arteries of the body. Granular kidney quickly leads, through impurity of the blood, to arterio-sclerosis, which therefore becomes superimposed on the renal disease.

In conclusion, it may be pointed out that this explanation of the mode of origin of arterio-sclerosis stands or falls on the validity of the hypothesis, which has been assumed, of the pathogenesis of fibrous hyperplasia.

THE EVOLUTION OF THE MODERN OPERATION OF HYSTERECTOMY.

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THE operation of hysterectomy for cancer of the uterus has become so overladen with discussions as to the advisability or otherwise of extensive removal of pelvic and iliac glands, which greatly complicate the technique without apparently favourably affecting the ultimate mortality,[1] that, in what follows, these disturbing questions, which cannot at present be considered settled, are scarcely touched; only the main operation as performed for fibromyoma, fibroadenoma, or chronic intractable metritis being described.

The earlier attempts at removal of the uterus were completed by the extraperitoneal fixation of the lower part of the cervix, as in the following case:—

Case 10.[2]—Mrs. H., aged 38, admitted to hospital, April 1893. This woman had had a wretched married life. She had had three children, the youngest being at the time of her admission, 13 years old. She was brutally kicked by her husband in the abdomen seven years before, and suffered for a long time from great pain at that point. Three years ago, from similar ill-usage, she developed an ischiorectal abscess. Six months after the kick in the abdomen she first noticed an enlargement which had steadily increased. More or less intermittent pain had been felt there until six months before admission, since which it had been constant, and during that time the enlargement had been much more rapid; she suffered also from dyspnœa and palpitation. On examination, a large, smooth, hard mass lay obliquely in and above the pelvis, the lower part springing from the uterine cervix which became lost in the mass, the upper rounded extremity reaching to the right hypochondrium. There was slight mobility from side to side.

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[1] Clarke, of the Johns Hopkins University, speaking of Wertheim, Ries, V. Rosthorn, Kronig, and Mackinrodt's operations for the more complete extirpation of pelvic glands, says: "I can no longer conscientiously prolong an operation in the search for pelvic lymph glands, with the certainty of a higher immediate mortality occasioned by it, without a reasonable hope for a decided improvement in ultimate mortality. Unless there is a very appreciable improvement in ultimate mortality, the greater immediate mortality from these extensive operations will more than counterbalance any good that they may accomplish in an occasional case. This conclusion is based upon—1. The absence as yet of any known law concerning metastasis; for the glands of the side of greatest local involvement may be free, whilst the parametrium, or higher glands of the opposite side, may show microscopic foci. 2. The untrustworthiness of the microscopic appearance of a gland in determining metastasis; for a large, palpable gland may be removed from the iliac bifurcation, and prove to be of an inflammatory character only, whilst an invisible lymph radicle, or a microscopic gland immediately adjacent may be the lodgment place for cancer cells. 3. The absence of any law as to what type of case gives metastasis. A very limited local process may show wide glandular metastasis, whereas the opposite may be true in the extensive local involvement. 4. The peculiar distribution of metastasis, in that occasionally a lower group of glands may escape, whilst those above are involved."—*Progressive Medicine*, Vol. 2, 1907, p. 188. As these views absolutely coincide with my own, they form, I conceive, a sufficient explanation for the omission of any description of these operations, with one exception which is mentioned later.

[2] The numbers refer to my list of Hysterectomies.

On April 24, a long vertical median incision was made and the whole mass turned out with some difficulty from the pelvis; a strong elastic cord was passed round the pedicle formed by the uterine body about the level of the internal os; this was tied tightly; strong pins were thrust through from side to side, and beneath these a strong wire loop was laid and tightened up whilst the rubber cord was removed; the main mass was then cut away. It proved to be made up of large fibrotic tumours springing from the posterior wall of an otherwise not greatly enlarged uterus. The section had passed through an encapsuled fibroid, which was squeezed out from the peduncle; the wire thus became loose and several vessels required ligature; the wire was then again tightened and the abdominal wall closed around it; the tumour removed weighed 16½ lbs.

In those days, the peritoneum was always drained; a Keith's glass tube had therefore been already placed in Douglas' pouch, the upper end of which emerged from the abdominal cavity half an inch above the stump, and, from this, fluid stained with blood was drawn off from time to time until her death, which occurred on the second day. When the stump was examined after death, it was found that the vesical fundus had been caught by the constricting wire; during the two days there had been incontinence of urine, and no doubt, if she had lived, a suprapubic fistula would have been the result. The last case in which this method was used was that of a Porro's operation done in the succeeding year 1894.

Case 30.—The woman was a rachitic dwarf with flat pelvis, and was sent to hospital by the late Dr. Somerville of Wilmslow. She had been married six years, and during that time had had seven pregnancies, of which this was the last. Her first pregnancy ended in a miscarriage, the second went to term, and labour was terminated by a craniotomy; the third was also concluded in the same way. In the next pregnancy premature labour was induced at seven months. The child was born dead. The fifth went to term, and craniotomy was again required. The sixth was terminated at six months, the child living for one day; the seventh was allowed to go to term with a view to operation.

A living child was obtained, and as both patient and her friends desired that she should not be exposed to the risk of a future pregnancy, after the uterus was emptied it was brought out and its cervix secured by pins in the usual way; no wire was used, but a rubber cord was tied tightly around. The uterus was then cut away and the parietal peritoneum sewn around the stump below the cord. The stump was cauterised with the actual cautery. On the thirteenth day, it sloughed through at the level of constriction, and immediately retracted almost out of sight into the abdominal cavity. As the extremity was sloughy, some uneasiness was felt as to the possible result, but recovery though slow was complete, and she went home well with a living and healthy child. For some months however a clear passage existed between the suprapubic wound and the vagina which ultimately closed.

The disadvantages of this method were too patent for it long to maintain its position. It was the method of Spencer Wells, Lawson Tait, and the elder Keith. The tension on the stump was very great; the cross pins fixing it, in many cases, produced ulceration of the abdominal wall upon which they lay in spite of every care to prevent this, whilst the dragging upon the broad ligaments and bladder rendered the existence of the patient during the ten to fourteen days before separation took place, extremely miserable. Moreover, it was difficult to ensure asepsis of the wound, and small abscesses were not infrequent in the abdominal wall around. In one case, which is reported in my book on "Uterine Fibroids,"[1] the patient died on the fourteenth day from the rupture of an abscess by the side of the peduncle. And when at last the process of necrosis was so far advanced that the pins no longer prevented it, the sloughy stump retracted deeply into the abdomen, and many dangers from septic absorption, prolonged suppuration, or even peritonitis became possible. From this point, operative work proceeded on two opposite lines; whilst many surgeons continued to attack the uterus from above, striving to improve the technique employed, others began to attack it from below through the vagina; and hysterectomies were said to be "abdominal," or "vaginal," according as one or the other route was taken.

Of course, even when technique was perfected, the choice would still depend a great deal upon the size of the uterus to be removed, and also upon the disease for which the hysterectomy was performed; thus cancer of the cervix, if limited to that part, practically almost excluded an abdominal section; whilst a large fibromyoma would be less likely to be attacked per vaginam, from the mere difficulty of extracting such a mass through the comparatively narrow vagina without damage to the surrounding structures; but apart from such obvious distinctions, the personal predilection of, and manual skill attained by various surgeons in one or other mode of attack counted for a great deal; so, for a long time operators were divided into two camps, vaginal and abdominal operators; the latter pointing to the greater certainty with which all diseased structures could be removed by the abdominal method, the former to the undeniably lower mortality of vaginal operations. Landau's method of splitting and enucleation, to which further reference will be made, came to the support of the former, by rendering it possible to extract per vaginam masses far larger than could otherwise have been attacked by this route, but even with this assistance an operation upon a voluminous fibroid involved much almost unavoidable damage to the parts around. The bladder and ureters were especially in danger, and several ureteral fistulæ occurred in the practice of those who carried their enthusiasm for this route to extremes. In other cases, tubo-ovarian abscesses, or extensive adhesions above might render the descent of the uterus, even after the main bulk of the tumour had gone, an impossibility, whilst their effect was seen in the increased difficulty of carrying out the work of morcellation itself.

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[1] *Uterine Fibromyomata: Their Pathology, Diagnosis, and Treatment.* Rebman, Ltd. London. 1901.

On the other hand, the difference in the relative mortality of the two routes was extremely marked, and, although this might be to some extent due to the fact that the worst cases could only be attacked through the abdomen, yet it was not entirely explained by that fact. In 1901, I collected a list of vaginal hysterectomies, 1,075 in number with 36 deaths, or 3·3 per cent. Weill, in 1899, had a list of 392 cases of abdominal hysterectomies with 63 deaths, or 18 per cent. I purposely give these early lists of mortality, because it was upon them that operators at that date had to rely in making their choice. The convalescence from a vaginal or an abdominal operation for a similar condition was also very different. Even in the earlier operations, it was noted that ordinarily recovery from a vaginal extirpation was much more rapid and uneventful than that after an abdominal; whilst it was free from the sequent ventral hernia which so often followed the earlier methods of union of the abdominal walls.

I have referred above to the method of splitting the uterus introduced by Landau. Up to this time, all uteri were removed entire and only after the previous ligature on both sides of the afferent vessels; the necessity for this antecedent ligature greatly limited the applicability of the vaginal method. The vagina must be sufficiently capacious not only to permit the descent of the organ to be removed, but also to admit of the approach to, and the safe ligature of these vessels whilst the uterus was still *in situ*, and this might be very difficult if not impossible, especially in women who had not borne children. Many fibroid uteri were, *ipso facto*, ruled out.

Landau's proposal was to split the uterus mesially from below, removing as the section proceeded, any masses or tumours which might be encountered in fragments sufficiently small to be extracted through the vagina. In order that this might be safely done, he found that it was necessary to keep up steady traction upon the two lateral halves of the uterus during the process of bisection, and until the vessels supplying them with blood had been ligatured. If this were done however, the operation was almost bloodless, whilst the divided uterus would descend much more easily; and by the process of "morcellation" as the manœuvre of splitting and excision of masses of fibroid tissue en route was called, a bulky uterus would often shrink to a mere fraction of its former size. The actual ligature of the afferent vessels could be postponed with safety until such shrinkage had taken place and the divided uterus was practically outside the vulva; therefore ligatures could be much more easily and securely applied.

Another advantage was discovered as the use of this method became more general. There was far greater safety to the bladder. As the cervix is split, its exact thickness becomes evident and the white surface of the uterine tissue on the stretch is clearly distinguished from the red bladder wall in front. During the separation between the two, there is therefore no danger of digging into the uterine tissue on the one hand, or of vesical perforation on the other. But in spite of this the vaginal route at first had one great drawback. The operation was considered finished when the uterus and, possibly, one or both of the tubes and ovaries were removed and complete hæmostasis secured; a wide gap was left in the pelvic peritoneum through which the vagina and the peritoneal cavity communicated with each other. This opening was stuffed with gauze, medicated with some antiseptic, usually iodoform.

From the first, the idea of leaving a wide opening in the pelvic floor after hysterectomy was repugnant to the surgical sense; it was true that a vaginal plug, extending upwards to the peritoneal level, was rapidly covered by a layer of protective lymph; such a plug however, could not be left there for long; for one reason because that so long as it remained patients complained of sacral pain, and sometimes of difficulties in micturition and defæcation, symptoms which were all relieved by its removal. The most important reason however, was that the plug itself rapidly became septic. Soaked with blood, as it was bound to be from the exposed connective tissue, and in close proximity to the rectum, it soon became foul and its removal was imperative. The protecting layer of lymph could not be expected in that time to become sufficiently resistant to be able to withstand the downward thrust of the intestines above, and therefore that peculiarly annoying and almost irremediable condition, a ventral hernia, might follow as in a case reported by Baldy, in 1897, whilst, if the protection were incomplete, there might be adhesion of a loop of small intestine to the raw edges of the open peritoneum, as in two cases reported by Coe in the *Amer. Journ. of Obstet.*, Vol. 23, and others by Giresse, in his Thèse de Paris, 1896, with consequent kinking of the intestine, uncontrollable vomiting, and acute obstruction as the result.

But such an opening was not in the least necessary. After removal of the uterus, two free peritoneal flaps are left, one anterior, another posterior; if these were united by a continuous suture, the peritoneal cavity would be reformed, and, the stumps of the Fallopian tubes being drawn down on either side and fixed by the same suture, all raw surfaces would be at once rendered extra-peritoneal. No point to which intestine could adhere would be left, and if it were thought wise, the two stumps could be drawn together beneath so as to render taut both broad ligaments. Loose gauze could be placed below to collect all discharges from the raw surfaces; the peritoneal flaps would within 24 hours be soundly united, and thenceforward there would be no further risk of anything entering that cavity. The gauze placed beneath at the time of operation might therefore be safely removed at the end of 48 hours before it had time to become foul and would not need to be replaced. The relief to the patient would be immense. There would be no more need for plugging and replugging, nothing but easy douching once or twice in the 24 hours, in order that no discharges might be retained. And experience showed that this reasoning was correct; the raw surfaces rapidly healed and the vaginal vault was perfectly restored; no sign of vaginal hernia ever appeared and the convalescence was as uneventful as that after a normal labour. At no time was there any hint of intraperitoneal adhesion. If catgut was used throughout, no sutures required removal.

At first, all ligatures were left long with the idea of favouring drainage, as in the following case:—

Case 15.—Mrs. A., æt. 55, carcinoma of cervix. Operated upon July 1893. Vaginal hysterectomy. All ligatures left long, and brought down into the vagina. The last ligature became loose, and was removed two months later. Recovery, however, was good, and the patient was seen alive and well, 14 years after, in 1907.

But it was evident that the retention of these long threads caused the convalescence, as in this case, to be unduly prolonged; and as the necessity for drainage by them became less apparent, so the material used was altered in order that they might be absorbed, and they themselves were cut short.

Occasionally, perhaps in 1 per cent. of the cases, the inflammatory or other changes so altered the peritoneal flaps, that sutures in them would not hold, in which case plugging was still required as a *dernier ressort.* I append notes of the only instance of this kind which has occurred in my practice.

Case 35.—Mrs. P., æt. 57, cervical carcinoma, seen with Dr. Wilkinson of Manchester. Operated upon October 1894. Vaginal hysterectomy. There had been previous kraurosis of the vulva and part of the vaginal wall. The anterior peritoneal flap tore through with every stitch, so that plugging was resorted to. Rapid recovery from the operation, but subsequent period of religious melancholia. Ultimate perfect recovery.

The condition of the patient might, in a severe and prolonged operation, especially if the constitution had been broken down by previous great losses of blood or by the presence of foul discharges, render it impossible to finish the work satisfactorily. It might be necessary to leave a number of compression forceps in such situations as to render it impossible to immediately close the pelvic peritoneum, as in the following case, seen with the late Dr. Parkinson, of Manchester, in 1899 :—

Case 60.—Mrs. W., æt. 65. Eight years previously a fibroid polypus had been removed per vaginam by another surgeon. There had been more or less pain ever since. In the light of the after-history, it is probable that the pain began long before, and was due, then and later, to the gradual forcing of a succession of small submucous fibroids through the internal os; the first being removed at that time. She had been under the charge of several medical men and for the last three years had been considered to be the subject of carcinoma, owing to the intolerable stench from necrosing masses which were discharged from time to time. The whole uterus was greatly enlarged and bossed, but there was no infiltration of the parametric tissues. Abdominal hysterectomy was performed; there were many adhesions in Douglas' pouch and elsewhere, and when the main mass was removed her condition was extremely grave; many forceps were left on, enveloped in gauze. The abdominal wound was closed by through and through sutures around these, and the patient was put back to bed almost *in extremis*. She however recovered, the forceps were gradually removed during the next three days, and she lived for 15 months in great comfort until fresh masses developed in the abdomen, and she ultimately died of exhaustion, but with none of the foul discharges which had previously isolated her from all companionship.

Such cases are however only exceptional, and the conduct of the surgeon must in them be decided by the peculiar circumstances in which he finds himself; but the ideal to be aimed at in every case is to leave the peritoneum once more a closed sac; drainage of the peritoneum would appear to be one of the remanets of a bygone past. The progress of vaginal hysterectomy, after the introduction of Landau's splitting manœuvre which did so much towards simplifying the difficulties of the operation may indeed be considered as depending mainly on the gradual settlement of the question: Is drainage necessary? At first the peritoneum was drained in every case by leaving the pelvic peritoneum open and by gauze passed up to the level of that opening, as already described; later the gauze was only used if many adhesions had been broken down, and Fallopian tubes containing pus or other fluids had been enucleated, leaving raw surfaces which might bleed, or which might have been infected; and, in such cases the gauze was frequently packed into and over these surfaces; but certain cases showed that in neither condition was drainage necessary; that, indeed, recovery was much more even and rapid without it.

As showing the innocuous effect of blood, the following case may be narrated, although the part removed was not the uterus but a very adherent ovarian cyst, since the principle involved is the same:—

Mrs. M., aged 60, sent to me by Dr. Larkam, of Prestwich, Manchester, in June, 1908. This patient was suffering from a large ovarian cyst, the upper limit of which reached 2 inches above the umbilicus. On opening the peritoneum the cyst was found to be firmly adherent to the anterior abdominal wall, to the omentum, and to numerous coils of small intestine. These were all carefully peeled off but a large extent of raw surface was left, from which blood oozed persistently; a few points were tied with iodine gut, but it was impossible to secure all. The space above the bladder, the anterior wall, Douglas' pouch, the intestines which had been adherent, from all of these, a slight but steady dripping of blood went on; hot saline solution had little effect, and a Keith's glass tube was prepared, so that the blood which was certain to accumulate, might be withdrawn. By accident this was broken, and no other being at the moment available, the abdomen was entirely closed; four hours later, the patient was somewhat collapsed and the pulse was rapid, showing that the bleeding had not ceased with the closure of the peritoneal cavity; after a stimulant she recovered and the face became flushed; the pulse was still rapid. She was placed in the Fowler position, and adrenalin in a 20-m. dose was injected hypodermically, this being repeated in 10 m. doses every four or five hours. Calomel was also given, and a terebinth enema, which was followed by a good result, large amounts of flatus being passed. She had an excellent night, and the urine passed normally without the use of a catheter. The next morning she was in good condition. At night, however, the abdomen was slightly distended and the pulse was 132, the respirations 38. Another turpentine enema was followed by free action of the bowels with the escape of much gas, and the abdomen became normal; it was never rigid. The face was placid. On the tenth day the dressings were removed and primary union was found. In three weeks she was out of bed, and her subsequent recovery was perfect.

It will be evident that, in this case, most of the elements, which might have been expected to produce disaster, were present. The patient was of the lymphatic type; she looked fully her age, which even in years was beyond that at which much resistive or recuperative power is to be expected; she had already been through an exhausting process, as evidenced by the condition found at operation, and especially by the numerous adhesions present. These adhesions were extensive and involved not merely the parietal peritoneum, but the intestines and the mesentery. From all of these a continuous flow of blood went on and was still going on when the abdomen was closed; if the peritoneum itself could not be trusted to absorb again pretty rapidly what had been thrown out, clots would form, which might easily become infected from the intestines, and septic peritonitis would result. That this did not follow, but on the contrary, that the patient rapidly recovered, greatly strengthens the position of those who hold that one of the most important points in the technique of an abdominal or pelvic operation is the reclosure completely without drainage of the peritoneal sac. It is even questionable whether the presence of pus itself in the cavity is sufficient justification for drainage; certainly the escape of such pus as is found in tubo-ovarian abscesses in the quiescent stage, in which all active micro-organisms are probably dead or greatly attenuated in force, and where the main bulk is removed leaving only possible soiling of the peritoneum, does not appear to be beyond its powers, as is shown in the following instance:—

Case 115.—Mrs. C., aged 43, admitted to hospital, April 1899. One child, 21 years previously. Never well since. Had first noticed a swelling in the right iliac fossa two years before admission, which was painful to touch; with its appearance there had been vomiting which had recurred from time to time. In the right iliac fossa, a rounded mass the size of an orange was felt, which bimanually could be defined as a tense elastic swelling closely connected with the uterus and apparently free from the abdominal parietes.

On April 12, laparotomy was performed. The mass was found to be a tubo-ovarian collection of pus, attached to the brim of the pelvis and the peritoneum over the psoas muscle; a loop of small intestine and the omentum were also firmly adherent to it. On separating the omentum pus gushed out; the majority of this was caught on sponges, but as this happened at the very commencement of the process of separation, it was impossible to adequately protect the peritoneum entirely; the mass was enucleated and removed as quickly as possible, and the parts dried by sponges. The abdomen was entirely closed without drainage.

The temperature rose the same night to 102, the next day at 2 p.m. to 102·8, but steadily fell afterwards to 99·4 on the third day. The abdomen throughout remained supple. The patient recovered, and was sent to a convalescent home on May 19.

In September of the same year, she returned complaining of a great deal of pain, and with a much enlarged and somewhat bossed uterus. On the 29th of September, vaginal hysterectomy with Landau's splitting was done, and as was expected, the uterus was found to be fibroid. One large encapsuled mass was found in the posterior wall. Douglas' pouch could not be opened, and the uterus came down with difficulty, owing to the numerous adhesions above and behind the organ. When the split halves were brought outside, it was seen that a large elastic mass still remained occupying the site of the left ovary; this was enucleated and proved to be another tubo-ovarian abscess. The removal of this adherent mass, which burst during enucleation, necessarily left a rough taggy surface which was soiled by the escaping pus; but in spite of this the peritoneal flaps were united by sutures, completely closing the peritoneal sac.

There was some sickness for the first three days, with soreness over the hypogastrium, but the abdomen remained supple and the pulse soft, regular, and fairly full, from 80 to 86. The face remained placid. In short, although one or two sloughs came away from the vaginal tissues, showing, I conceive, that the pus contained in the last tubo-ovarian mass had not entirely lost its virulence, nothing happened in the peritoneum, which proved itself quite able to look after any spilt within, and the patient completely recovered.

Clark, of the Johns Hopkins Hospital, in 1897, published an exhaustive and convincing paper, showing the uselessness, and in many cases the harmful effects of attempts at drainage through the abdominal wound; but for many years after drainage per vaginam was considered necessary, and even to-day some gynæcologists lay great stress upon this. It would appear however that the peritoneum is capable of much more in the way of repair than has been credited to it, but that in order to obtain the full advantages which it has in its power to give, the peritoneal sac must be completely closed.

Even the gauze drain placed between the raw surfaces below the peritoneum, after a vaginal hysterectomy, would appear to be often unnecessary, and to act rather as a foreign body than as a safeguard; as illustrative of this, the two following cases are instructive :—

Case 315.—Mrs. C. H., æt. 66, admitted June 1908. Four years ago, whilst moving a bed, she felt something give way, causing a great deal of pain. This brought her to her knees, and she remained in that posture for ten minutes, unable to move. About one week later actual procidentia was found; six months later a ring was placed, which however failed to retain the protrusion and caused fresh discomfort by its presence.

At the time of admission the uterus was found to be heavy, and the os ulcerated. The vagina was roomy, and its walls relaxed and flabby.

As at her age the uterus could be of no further service to her, it was removed per vaginam, the pelvic peritoneum closed, and anterior and posterior colporraphy performed, no gauze drain being placed; she bore the operation well and was up and about in 18 days, scarcely any discharge of any kind having been seen. The deep sutures of silkworm gut were, as usual, removed at the end of three weeks, all the parts having soundly healed.

Case 316.—Mrs. A., æt. 36, admitted June 1908. Actual procidentia had been noticed since the birth of her last child three years previously. The right ovary had been removed elsewhere five years ago, at which time curettement had also been done. Sensations of pain and weight had been felt since her first confinement seven years ago, and these had been only accentuated after the operation.

There had been incontinence of urine, which was relieved after the introduction of a ring five weeks before admission. Ever since her first confinement there had been purulent leucorrhœa, which, at the time of admission, was very offensive. On admission there was absolute procidentia with patulous os, which was cartilaginous. Precisely the same operation was done as in the former case, with the exception that a gauze drain was placed between the raw broad ligament and bladder surfaces below the reunited pelvic peritoneum. This was removed with some difficulty in 48 hours and was followed by the discharge of some pus. Daily douching was instituted, but the purulent discharge continued for 32 days, gradually becoming less. In neither case were there the least signs of peritonitis.

The respective ages of the two women should be noted; the woman of 66, without a drain, made a far quicker and more even recovery than the woman of 36 with a drain.

Reference has already been made to the difficulties experienced during vaginal operation in some nulliparous women, and these difficulties are accentuated should the patient be over 30 years old. The vagina is narrow and tends to become rigid, so that anything like a large speculum cannot be introduced. In such cases, in view of the much lower mortality that attends vaginal operations, Schuchardt advocated the division on one side of all the vaginal tissues, starting near the cervix, and carrying the incision downwards and outwards to a level with the anus but outside the anal sphincter. There is no doubt that by such a manœuvre much more room is obtained, and consequently much freer access to the parts to be excised; but so many planes of connective tissue are thereby opened, and the dangers of secondary infection so much increased, that the plan does not commend itself, I believe, to the majority of abdominal surgeons who prefer in such cases to attack the uterus from above, and since abdominal surgery has *pari passu* with vaginal, immensely improved, both as to mortality and results, doubtless with good reason.

Vaginal hysterectomy still maintains its position as the operation of least mortality, and as being followed by the most rapid convalescence, but many cases still require the abdominal operation, the development of which has now to be traced.

When the external fixation of the cervix—extraperitoneal hysterectomy — was in process of abandonment, surgeons adopted what has been called hysterectomy with intraperitoneal treatment of the stump, or subtotal hysterectomy. At first, it was considered necessary to remove both tubes and ovaries along with the uterus, but, later, it was recognised that the unnecessary ablation of these organs, whilst still functionating, brought about certain undesirable mental effects, which were grouped together under the name of "acute menopause." Consequently in the later operations the ovaries were left[1] unless hopelessly diseased; the operation therefore, after opening of the abdominal wall, was commenced by doubly ligaturing and dividing the Fallopian tubes on both sides, just outside the uterine fundus. This division opens up the broad ligaments on either side. A second double ligature was applied to the round ligaments and these were also divided; a transverse incision was carried through the peritoneum in front of the uterus uniting the two lateral incisions just above the limit of the bladder, which could be easily located by the vertical veins which course over its surface beneath the peritoneum and which end at its upper limit; or by the much closer application of the serous membrane to the uterus than to the parts below. When once the peritoneum was divided, the bladder was easily pushed down by sponges to the vaginal limit and the front of the uterus and supravaginal cervix laid bare.

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[1] Some surgeons, however, still remove them; they consider that the troubles of acute menopause have been exaggerated, and that by clearing them away, a cleaner wound is left, with less likelihood of later trouble from cystic, or other degeneration. The following case would appear to favour this contention:—

Case 235.—Mrs. J. A., æt. 41.—Sent to hospital by the late Dr. Walker, of Swinton. January 1907. Five children, the last being stillborn. Uterine discharges and pain for eight years, during which time she had had three miscarriages. She had been curetted several times without any good effect; she had also been operated upon for fistula and again for hæmorrhoids. She came complaining of persistent sacral and hypogastric pain with purulent uterine discharges.

January 28th, 1907. The uterus and both Fallopian tubes, which were distended with pus, were removed by the abdominal route. The right ovary, which appeared healthy and showed no tendency at that time to cystic degeneration, was retained.

In June of the following year she was again sent to the hospital by Dr. Higson, Dr. Walker's successor, with pain in the right iliac region and persistent slight discharge from an eczematous-looking patch at the summit of the vaginal vault; bimanual examination revealed a tense mass above and adherent to the vaginal scar.

As the discharge had lately appeared offensive, and it was thought possible that some intestinal adhesion might be found, the abdomen was again opened and the right ovary was found adherent to the scar in a state of well-marked cystic degeneration; it was removed, no other abnormality being present, and the abdomen closed; she rapidly recovered, the pain and discharge disappeared and she went home well.

The bladder and ureters were thus carried away from the plane of future work and the uterus was now only held by the broad ligaments on either side, by the peritoneum behind forming the anterior wall of Douglas' pouch and by the attachment of the cervix to the vagina below. But in the broad ligaments, lying parallel with the main axis of the uterus, were the uterine arteries whose junction with the ovarians had already been ligatured above. These are the main afferent vessels of the uterus. In the ordinary subtotal operation, the vaginal attachment to the cervix was left untouched, the cervix being divided transversely just below the level of its internal os. The uterine vessels were therefore isolated to some extent and ligatured in this plane, after which the cervix was cut across and the uterus removed. Such division, of course, left the lumen of the cervical canal, lined by mucosa, open below in the centre of the cervical tissues. This might be aseptic, but in many of the cases for which hysterectomy was required it was not so. In cases of myofibroma, for example, when a submucous encapsuled fibroma had become pedunculated and was in process of gradual expulsion, the cervical canal would have been dilated by the submucosal tumour acting as a wedge, and driven forwards irresistibly by the contraction of the uterine fibres behind. The canal, thus widened, permitted the access from the vagina and through it from the external air of micro-organisms, which, acting upon the necrosing mass—for the constriction produced by the internal os effectually shut off all blood circulation from that portion of the fibroid mass which lay below—produced sloughs and most offensive discharges. The cervical canal, consequently, at any level below that of constriction was extremely septic, and could not easily be sterilised by any antiseptic application from below, the action of which would effectually be blocked by the presence of the necrosing mass of the tumour itself which would spread out mushroom-like below the line of pressure. Such an open septic canal would infect any sutures placed in its walls. Peritoneal flaps might be united over it, and so the peritoneal cavity itself might escape infection, but whilst peritonitis might not result, between the upper end of the cervix and the reunited peritoneal barrier pus would accumulate which could not find a sufficiently ready exit through the cervical canal itself, and would therefore spread out in the plane of connective tissue open around in the broad ligaments on either side, burrowing beneath the peritoneum.

This tendency to subperitoneal suppuration about the upper end of the cervix was met by various devices. It was proposed that, an opening being made in the posterior fornix through into Douglas' pouch, the upper end of the cervix should be brought through this and so the cervix bent upon itself, in order that both openings of the cervical canal might lie in the vagina, the anterior wall of the cervix looking upward and being covered by the united peritoneal flaps; any pus which might form in or about the cervical canal thus draining into the vagina beneath. Other surgeons attempted to destroy any infective material in the stump left behind by applications of crude carbolic acid, nitric acid, formalin, or the actual cautery to the lining mucosa. Le Bec cut through the cervix left from above downwards by two incisions, which isolated the central segment containing the mucous canal, which segment being removed, left only the cervical tissue of both sides and these two were then sutured together. Others split the cervix mesially and pared away the tissues from either side, until only the outer surfaces were left and these were then united by sutures. In every possible way, the retention of some portion of the cervix was attempted, from a belief that even a small amount of uterine tissue had the power of maintaining the ovaries in a normal condition and preventing their atrophy, and consequently the appearance of the mental aberrations associated with "acute menopause," or for the more simple reason that this constituted a more rapid operation than one which also removed the cervical stump.

Believing, as I do, in the advisability of removing the cervix with the rest of the uterus, I have not often practised the subtotal operation; but the following is an instance:—

Case 145.—Mrs. M. W., aged 49, admitted March 1901.—Menstruation commenced at 15 years; this was always painful before and for the first two days of the period. Has had six children, and one miscarriage 10 years before admission; the last child followed the miscarriage and was born dead; all her confinements had been tedious; forceps were required with the last.

For six or seven years before admission, she had suffered from attacks of pain, resembling labour pain, coming on at irregular intervals and mostly referred to the hypogastrium. During the last two years, these had ceased to be so acute and this improvement had been cotemporaneous with the appearance of a tumour in the same region. Urination had been frequent and insistent. From time to time she had had great losses of blood.

March 4, 1901. Tredenlenburg position; usual incision through the inner edge of the right rectus; firm largely bossed large uterus with no adhesions turned out. After both tubes and ovaries, which were healthy, had been separated, the uterus was removed by cutting transversely across the cervix; the stump left was treated, as Le Bec directs, by cutting out the centre containing the mucosa; a gauze drain was drawn through and the two remaining portions of cervix united by sutures, the peritoneum being stitched over all. The abdominal wound was then closed.

The operation was followed by the appearance of several blebs containing pus over the sacrum and gluteal regions; she suffered also from bronchitis to which we learnt, later, that she was very subject. The gauze drain remained in position for a week, only being removed with difficulty; the discharge was purulent and foul smelling, but all eventually cleared up, and she was discharged well, on April 16th.

It is curious that the experience of vaginal hysterectomies, in which the cervix is necessarily first removed, had for so long no effect in dispelling this fear of ovarian atrophy, or in demonstrating that the retention of the cervix was not necessary, either to avoid mental disturbance or to prevent vaginal hernia, which was equally invoked as a reason for its preservation.

Various modifications of this operation were made in order to cope with the many difficulties introduced by two main causes. The first of these was the effect of inflammation. Tubo-ovarian abscess was a frequent complication, both of fibromyoma and of metritis, and around the tubes and ovaries so affected many protective adhesions were formed, immensely useful in limiting the inflammatory process to the pelvic region but gravely complicating any operation for removal. The second cause of difficulty was the frequently eccentric growth of the fibromyoma itself, which, when it sprang from the cervix or lower segment of the uterine wall, burrowed between the layers of the broad ligament and displaced the structures, normally passing between them, the ureters, and uterine arteries. If one of these masses started below these, it lifted them upwards and outwards; if above, it might depress them, and in either case cause them to lie in abnormal and unexpected positions. The two main modifications of the original operation were those of Kelly and Doyen, and both had reference mainly to the abnormalities introduced by eccentric growth. The peculiarities involved in the presence of adhesions were so various that in each case the surgeon was bound to deal with them in the way which appeared best at the time of operation, it being impossible to construct a plan which would be suitable to each individual instance.

Kelly's method was most useful in cases where one broad ligament alone, or mainly, had been invaded. Beginning on the free side, the Fallopian tube was doubly ligatured and divided, or if the ovary and tube were diseased, the infundibuliform ligament of that side was so treated and so an opening made in the broad ligament, a transverse incision was carried across the anterior peritoneum, and the bladder pushed down; further separation of the broad ligament gave access on the same side to the uterine artery which was doubly ligatured and divided close to the lower end of the supravaginal cervix. The cervix itself was then cut across and the uterus pulled forcibly over towards the side on which the intra-ligamentous tumour existed. In this way the uterine artery on that side was pulled up, so that it might be secured and divided. When that had been done, the uterus was still further dragged over to that side, and thus the cervical growth was rolled upwards and inwards until it became entirely enucleated. Whether the ureter were above or below, it gradually slipped away from the rotating mass which was thus safely separated from it, and when at last the whole tumour came to lie over the side, only the ovarian artery and the peritoneal flaps of the remaining broad ligament required division. By means of this method of procedure many tumours, which at first sight appeared to be too dangerously placed for attack, proved to be safely and easily turned out of their bed.

Kelly's operation left the stump of the cervix behind. This could, however, be modified, as I have shown in *Uterine Fibromyomata,* so as to permit of entire removal. The following is an instance of the modified Kelly operation:—

Case 150.—Mrs. C. R., aged 42, admitted March 1901. Married for 19 years, no children or miscarriages. The periods were increasing as to the quantity lost, although this had never been profuse; pain was also increasing. She had been losing flesh and increasing in girth for about two years. About three years previously she had some difficulty in urination, which lasted for nearly a month, but then disappeared and had not returned. The patient was rather emaciated. The abdomen was much distended by an irregularly lobed tumour, of which the main bulk was on the left side but extended across the abdomen into the right renal region; indeed, the abdomen was so full that it was almost impossible to determine if there were any mobility. The tumour was elastic, multilocular, and, near the left anterior iliac spine, a small firm mass resembling the ovary could be felt sessile upon the main mass below. This was not painful on manipulation; per vaginam, the uterus was found to be carried up out of reach, whilst between the bladder and the anterior vaginal wall a lobulated elastic mass could be felt, which was continuous with the main tumour. There was no free fluid in the peritoneum.

March 25th. Patient in the Tredenlenburg position; incision between umbilicus and pubis; the tumour presented at once without adhesions, and was so evidently cystic that it was tapped at the most elastic point; but little fluid escaped, and that mostly blood. The abdominal incision was then enlarged to midway between the umbilicus and the xyphoid cartilage and the tumour turned out; a long, angled forceps, passed into the vagina, was made to project against Douglas' pouch, whilst the uterus was forcibly drawn forward over the symphysis, and its point was cut down upon. Into the opening so made the finger was passed, but the cervix and os had been so blended with the tumour that the os could not be seized with an erignè, as in Doyen's method. Of the two sides, the right was most filled up by cystic masses, therefore the infundibular ligament outside the left ovary was tied and divided. All the veins were greatly dilated, and the Fallopian tubes on both sides were spread over the surface of the tumour. A transverse incision was carried over the front of the mass above the bladder, which was pushed down; the uterine artery on the left side was found, ligatured, and divided; then, with the aid of the vaginal forceps, the vaginal wall was cut through all round from the opening already made behind, using the point of the forceps as a guide. After the vaginal attachment was freed, it was easy to roll the uterus more and more over to the right, bringing the right uterine artery within reach, and permitting of its ligature. Further traction caused the cystic masses on the right side to roll out and up until they were quite away from the ureter, and ligature of the ovarian vessels on the right side completed the enucleation. A transverse suture reunited the peritoneal flaps over gauze drawn through, and the abdominal wound was lastly closed. The mass weighed 19 lbs., apart from the fluid which escaped during the work.

Kelly's method, as has been seen, was most suitable when the main mass of the tumour occupied one broad ligament and, as originally planned, left the cervix behind. Doyen's method was equally practicable if both ligaments were invaded, and removed the entire uterus with all tumours.

In Doyen's method, both tubes, or both infundibular ligaments, were ligatured and divided, following which an incision was carried through the posterior peritoneum across Douglas' pouch uniting the two, and dipping downwards in the centre as low as a protrusion produced by passing an angled forceps through the vagina, and making its point press the posterior fornix upwards and backwards. The incision was at this point carried deeper so as to expose the tip of the forceps, and open up the vagina. This opening was widened until the whole posterior wall was divided; a long bent hook, called by Doyen an erignè, was passed through this opening and by it the os uteri was caught and dragged forcibly backwards and upwards. By this procedure more and more of the lateral walls of the vagina was exposed and divided, until at last the anterior wall in its turn was brought within reach and cut across, care being taken at each step to divide only vaginal tissue.

When the vaginal attachment was entirely severed, it was possible, by a continuance of the forward movement, to peel the uterus away from the bladder from below upwards, and any intra-ligamentous growths in the same way out of their connective tissue beds; the traction kept the line of a curve, having the symphysis pubis as a centre, and at last the only remaining attachment left was the anterior peritoneum, which was divided transversely. The uterine vessels had been drawn up with the uterus, and were easily ligatured on either side. The ureters slipped away from the lateral tumours, which were disengaged from beneath them, and in this way these structures escaped risk of injury. After the uterus and tumours were gone, the pelvic peritoneum was again united by a continuous suture, passing from one iliac brim to the other over a gauze drain, drawn through into the vagina by the vaginal forceps which had been left *in situ*, and the anterior abdominal wall was closed.

This is a method which I have frequently employed, and the following two cases will illustrate its advantages:—

Case 170.—Mrs. M. J. F., admitted June, 1901. She had been a widow for 10 years, and had complained, for many years, of losses of blood; vaginal removal of polypus was done elsewhere, in the beginning of 1896. After this she is said to have had a tedious convalescence due to pain, passage of pus from the vagina and incontinence of urine, from which she still suffered; this, however, was becoming less, whilst the hæmorrhage was increasing both as to quantity lost and as to the frequency of its occurrence. Examination showed another polypus partly extruded and a much and irregularly enlarged uterus.

July 1. Abdominal hysterectomy was done by Doyen's method, the patient being in the Tredenlenburg position. The operation was more rapidly carried out than by any of the other abdominal methods, and the convalescence was equally speedy.

Case 190.—Mrs. L. P., aged 27, admitted August, 1903. Her main complaint was of recurrent hæmorrhages, consequent weakness, and of a mass which was enlarging.

In the lower abdomen was a swelling suggesting a six months' pregnancy. The breasts, however, were flaccid, without areolæ, or marked follicles; bimanually, the mass was felt to be extremely irregular in outline, to extend into both broad ligaments, though more into that of the left than into that of the right side. Douglas' pouch was distended by a round, elastic mass which crowded the os upwards and forwards behind the pubis; the mass itself was of unequal consistence, being tense and elastic in Douglas' pouch, firm in the hypogastrium, and nodular in the left upper portion; there was no difficulty with urination, but some with defæcation.

August 31. Patient in the Tredenlenburg position. Long mesial incision, permitting the main mass to be brought out over the pubes; a long-handled forceps was passed into the vagina, causing a protrusion of Douglas' pouch at the level of the posterior fornix. This was cut down upon, and the vagina thus opened; through this opening Doyen's erignè was passed, and the os seized and drawn backwards. The vaginal tissues, thus rendered prominent, were divided all round, traction being kept up, the posterior wall of Douglas and of the broad ligaments on either side were cut through as far as their peritoneal wall, and the uterus being rotated forwards peeled away from the bladder in front, whilst the growths on either side followed the uterus and were thus enucleated from below upwards. The last steps were the division of the infundibular ligament on the left-side removing tube and ovary, with division of the tube on the right side, thus leaving the right ovary; followed by a transverse division of the peritoneum above the bladder. When all was clear the two peritoneal flaps were reunited across the pelvis by a continuous suture; the ease with which the removal of so large and irregular a mass was effected, was very noticeable.

The shock of the operation was, however, great, and transfusion with other measures had to be resorted to. Convalescence, too, was prolonged owing to an abscess which formed below the bladder, but ultimately the patient returned home well, and reported herself a month later in perfect health.

In certain cases, however, the whole process, if done from the abdominal side, took a long time to complete, and during the whole of it the abdominal wall was open and the peritoneal cavity exposed, although, thanks to the Tredelenburg position, in which most of these operations were done, the intestines themselves were under cover in the supra-umbilical portion of the abdomen. And if a considerable amount of time was required for dealing with fibromyomatous tumours alone, still more was needed when the operation was complicated, as it often was, by adherent pyosalpinx, or tubo-ovarian abscesses. As an illustration of what was, and is still often required at such times, the following case may be mentioned:—

Case 55.—Mrs. S. A C. aged 46 years, admitted July 1898. Has had two children, the youngest 21 years old; no miscarriages. In her last labour she was attended by a midwife, and was not able to be out of bed for two months afterwards. She dated her ill-health from that confinement. After seven or eight years of constant sacral and hypogastric pain, she consulted a doctor, who diagnosed a prolapse and inserted a ring; this relieved her a great deal, and she wore it for about two years, when it was broken and she did not replace it. At that time she first became aware of "something enlarging inside." For the last 14 months she had been much worse, and had been chiefly confined to bed.

On examination, the uterus was found to be enlarged irregularly, apparently retroflexed with two firm masses behind and on either side. Both these and the uterus were tender on pressure; the cervix was split and covered by enlarged follicles. The woman herself had lost flesh and bore a look of prolonged suffering.

On July 1st, she was anæsthetised, and placed in the Tredelenburg position. A mesial subumbilical incision was made, afterwards prolonged upwards, as more room was required; the omentum was adherent to the pelvis, the bladder, and the uterus; this was ligatured, divided, and pushed up. When this was out of the way, a coil of small intestine was found to be adherent in Douglas' pouch to the posterior uterine wall and to two masses on either side; this was peeled out and pushed upwards; the left mass, which proved to be a large tubo-ovarian abscess, was enucleated and removed. The right was still more adherent, and burst during separation.

Even when both these masses were taken away, the uterus was still firmly fixed; the inflammatory processes around appeared to have stiffened and infiltrated the broad ligaments. By adopting Landau's method, and splitting the uterus from above down into the vagina, it at last became possible to dislodge it, and the two halves thus becoming mobile, were, each in turn, removed. But the operation had lasted two hours, and the lining surface in the pelvis was stiffened and ragged; gauze was therefore drawn down into the vagina, and left level with the opening in the pelvic peritoneum; the abdominal wall was closed.

A great amount of collapse followed. The patient was quite blind for nearly 12 hours; her eyesight not clear for 24; stimulant and nutrient enemata were given every two hours, and strychnine was injected hypodermically. (It was before the days of continuous saline transfusion and the Fowler position.) Eventually, after a long convalescence, she recovered, and was sent to Southport on the 30th of August.

With a view of reducing the time during which the abdominal cavity had to remain open and at the same time to save loss of blood, in 1907, I advocated a combined operation before the British Gynæcological Society, and adduced several cases to prove its advisability in such cases as those described above. In this method, the work is begun from the vagina, the patient being in the lithotomy position; whilst so placed, the uterus is separated from the vagina, bladder, and rectum, and the uterine arteries are tied. By doing all this before the peritoneum is opened from the front, the amount of shock is greatly lessened, and what still remains to be done is not only smaller in amount, but much easier, than if these preliminary steps had not been taken. Of course, if the operation can be completed per vaginam, there is no necessity for an abdominal incision and much more can be now accomplished through the vagina than was at first thought possible, but even yet there are some cases in which either the adhesions above are so many and so firm, or the mass of the tumour so great and curiously placed, that persistence in the vaginal method, after these steps have been taken, is useless and hopeless. An illustrative case is the following:—

Case 130.—Mrs. W., aged 33. Admitted October, 1899. Married 11 years; no children or miscarriages. Menstruation commenced at 13 years of age; she had always been regular as to time, but the amount lost had always been free and each period lasted five to six days; even before marriage, she used to pass large black clots with much pain, and since marriage, not only such, but large pieces of "flesh."

She had had three severe floodings; the first about seven years previously, which lasted three weeks; the second three years later, lasting a week; the last at the previous Christmas, which did not last long, but was furious. She was said to have lost a quart of blood at one gush. There had been some loss of weight and flesh; she was originally very stout. She had been treated by rest, pessaries for retroflexion, and drugs. Removal of the ovaries had been advised but declined.

On examination, the uterus appeared to be much enlarged, hard, and immovable, the swelling extending into both flanks. A diagnosis of fibromyoma was made.

On October 27, 1899, operation for complete removal was done. It was commenced with the patient in the lithotomy position; the cervix was separated from its vaginal attachments and from the bladder, the utero-vesical pouch being opened. Douglas' pouch behind could not be reached; both uterine arteries were ligatured.

The patient was then placed in the Tredenlenburg position, and the abdomen opened mesially. The subcutaneous and subperitoneal fat was very thick and the orignal incision had therefore to be extended upwards. On opening the peritoneum, the omentum, as usual, was found to be adherent to the pelvic brim and to the structures beneath; when this had been loosened and turned up, the pelvis appeared to be packed with tense, rounded, fixed masses, to which several coils of small intestine were adherent. The uterus, which contained several fibroids, was wedged in the centre, but, having been already so much loosened below, it was only necessary to tie each Fallopian tube at the angles of the fundus, to divide these, and to carry the anterior opening in the peritoneum round to each side and behind, in order to be able to lift it out. With its removal, room was obtained in which to work. So long as the uterus remained in position, no space was available into which the fingers could be insinuated, even the rectum being tightly compressed. The left tube and ovary were first enucleated; some thin, ichorous pus escaped, but, thanks to the space gained, a broad flat sponge had been placed below, and none reached the peritoneum; some, however, soiled the edges of the abdominal wound. Still more room being gained, the right tube, also full of pus, was peeled away from adherent intestine above and broad ligament below. When all was cleared away, a large raw, ragged surface was left in Douglas' pouch. By this time the patient was beginning to flag, and gauze was, therefore, drawn through from above into the vagina, no attempt being made to close the pelvic peritoneum, and the abdominal wound was closed. The operation itself lasted two hours and ten minutes, but the abdomen was only open in front for an hour.

Shock was marked for two hours but not after; vomiting continued for two days and then ceased; urine passed naturally 13 hours after the operation and flatus in 24 hours. There were no signs of peritonitis, the abdominal walls remaining supple throughout, and although, as was expected, the abdominal union broke down and suppurated for a while, being, of course, succeeded by ventral hernia, which later was repaired; ultimate recovery followed.

The advantages gained in this case by the preliminary work per vaginam were very great, although it would have been impossible, I believe, to have finished the operation by this route. When the pelvis was open from above, looking down upon it, there appeared to be no point where the tips of the fingers could have been placed between the masses which packed it. It was only the possibility of easily removing the uterus in the centre, which enabled the surgeon to get beneath those adherent pus sacs, which lay on either side and filled up the pouch of Douglas. Had not the uterine arteries been already tied and divided, it would have been impossible to reach them from above, and removal of the uterus would thus have been much more dangerous to carry out, if not impossible; whilst the open utero-vesical pouch also served as a landmark which was very valuable in showing the posterior limit of the bladder. The removal of the uterus supplied the key to the whole position. The amount of shock was much less than in the case just previously narrated, although the condition found was similar, and the convalescence, except for the suppuration of the abdominal wall, much shorter.

Thus it will be seen, by gradual improvements in various details, contributed by many workers in almost every country, hysterectomy has passed from the extremely dangerous and unsatisfactory stage of extraperitoneal fixation to the present practically perfect operations, which have but a very small mortality—in the case of the vaginal operation, almost none—and which are all, when successful, followed by a condition of perfect health and comfort. It may be well to formulate the underlying principles which have been kept in view throughout, or which have become evident during the process of development. They are these:—

1. The peritoneum should be open for as short a time as possible. It should be interfered with as little as is consonant with complete work, and the originally absolutely closed cavity should be reconstructed before the operation is finished.

2. Hæmostasis must be most thorough. No open vessels which can be tied should be left which may continue to bleed after the operation is completed. No clots should be present at the conclusion of work in the peritoneal cavity.

3. Whilst the foregoing statement is correct, time should not be unduly expended in preventing the oozing of blood from raw peritoneal surfaces which cannot be easily and quickly covered, as the "closed" peritoneum has much greater power of dealing with such exudation than was originally believed.

4. The drainage of a normal or slightly bleeding peritoneum is not only useless but mischievous. A drain is not only "a way out," but "a way in" for the passage of micro-organisms, and an incomplete sac has far less power than one which is closed.

5. The retention of any part of the uterus, as the vaginal cervix, is unnecessary and dangerous. Unnecessary, since the

vaginal vault can be as firmly and completely reconstituted without it as when it is still *in situ.* The result, so far as vaginal hernia, or lax condition of the vaginal walls, is concerned, is as good after vaginal hysterectomy, in which the vaginal cervix is necessarily removed, as after abdominal subtotal hysterectomy, in which it is retained. Dangerous, first because of possible carcinomatous degeneration of the cervix so left, and second, because of possible formation oɪ pus between the upper end of the cervical canal, and the reunited peritoneum over it. Many instances of such abscess formation might be cited; one of the latest is recorded in Cullen's *Adenomyoma of the Uterus,* published in 1908, p. 23—a woman, aged 43, upon whom subtotal hysterectomy had been performed, a drain being brought out through the vagina. On the 2nd day, the temperature rose to 100·6. For several days, it ranged between 100° and 101° F. On the 14th day, the cervix was dilated, giving exit to over a pint of pus, and it was not until ten days later that the temperature became normal. All this is absolutely unnecessary, and avoidable by the total removal of the cervix at the time of operation. In view of the more rapid absorption which takes place in the peritoneal cavity, fine silk is more suitable for ligatures and sutures used within, whilst more absorbable material, as, *e.g.*, iodised catgut, is preferable for those used outside that cavity.

7. Ovaries, which are not themselves diseased, should be preserved, as tending to avert the nerve storms associated with acute menopause.

These are the principles upon which successful work is based. Certain observations have also appeared to be worthy of note during the period of evolution, as tending to simplify, or to render safe the operations to which they refer. Such are :—(1) Inasmuch as the vaginal operation is followed by the least mortality and the quickest and easiest convalescence, and, as increased experience with this operation has demonstrated that much more can be done by this route than originally appeared possible, this method would appear to be "the method oɪ choice." (2) When extensive lesions above, or too great bulk of the tumour necessitating the operation contraindicate the vaginal route, much time as well as blood may be saved during the more dangerous exposure from above, by preliminary ligation of the uterine arteries and separation of the bladder and rectum from below. (3) In cases which are non-malignant, and in which therefore implantation of cancerous elements is not to be feared, the method of splitting the uterus, introduced by Landau, very greatly simplifies the difficulties ordinarily met with in vaginal hysterectomy, both by clearly defining the anterior uterine surface, and by rendering a comparatively fixed organ much more mobile. (4) In abdominal hysterectomy, in cases in which the broad ligaments are opened up by the growth, the method of Doyen, which enucleates these masses from below, or that of Kelly, which also enucleates such tumours from below and from one side, greatly reduces the risk of injury to the ureters, allowing them to slip to one side, and so out of the line of division. Ligature of a ureter is very easily done under the impression that it is a vessel, and many cases are on record of such an occurrence. (5) The proposition that the ureters should be defined by bougies passed into them before operation, as outlined by certain writers, is unnecessary, and imports another and avoidable element of risk into the case; the risk of sequent cystitis and ascending ureteritis. (6) In 1902, in THE PRACTITIONER, I suggested that preliminary catheterism, which was then the custom, was never required. That any emptying of the bladder might very well be done in the natural way before operation; that it was impossible, even with a catheter, to ensure the entire emptiness of the bladder, since the kidneys would continue to secrete during the process of anæsthetisation; nor was it desirable that the bladder should be entirely empty in these operations. A certain amount of urine was useful as assisting to define the vesical limits. Nor was it advisable that post-operative catheterisation should be permitted; the female urethra was not liable to stricture, nor was there, as in the male, any prostate, the swelling of which might mechanically obstruct the flow. The only possible source of difficulty was spasm due to a purely nervous origin. That catheterisation, once begun, had to be infallibly repeated for at least a week; that such catheterisation caused, in many cases, cystitis, which might persist, causing great misery, and that in all cases urine would at last pass naturally, if only patience were exercised, and a firm refusal to use the catheter persisted in. The experience of years has endorsed and confirmed this theory, and my nurses are strictly forbidden, in any circumstances, unless the bladder itself has been operated upon, to use a catheter. Patients have been kept for 30 and 36 hours, and in every case, without exception, patience and determination have been rewarded by the normal passage of urine. After it has once passed, there has been no further trouble.

The various operations, practised at the present day, have already been sufficiently described in the cases given above, with the exception of those lately introduced for bad cases of carcinoma, as, *e.g.*, those of Wertheim and Jacob. The author, as already stated, sees no reason to alter the old line of demarcation between operable and inoperable cases of uterine carcinoma; viz., that of freedom from infiltration of the broad ligaments, believing that, when such infiltration exists, removal is followed, within a very short time, by a return of the growth. When, however, there is no such infiltration, a modification of both abdominal and vaginal operations introduced by Wertheim, whereby sufficient of the vaginal tissue is removed in one piece, and continuous with the uterus, so that the growth or ulcerated surface is thereby covered in, and therefore infection of the raw surfaces around is prevented, is of very great value. In all cases, in which infiltration exists, however, much more comfort and greater length of life is secured for the patient by thorough curetting, followed by the application of formalin or the actual cautery, the whole process being repeated from time to time if necessary, than by any attempt at removal.

The following case is an illustration of the vaginal operation referred to:—

Mrs. C., æt. 54. Admitted, April 1908. Had had five children, the youngest 18 years old; no miscarriages. Menopause occurred at 48. Blood had been seen again for about 18 months from time to time in small quantities. For the last month, there had been slightly offensive discharge, and some sensation of weight and discomfort, scarcely amounting to pain, mainly referred to the sacral region.

Per vaginam, the os was seen to be deeply eaten out by a rugged ulcer occupying the junction of both lips on the right side and spreading rather more anteriorly than posteriorly; it was surrounded by hard infiltration, which was however limited to the cervical tissues and did not invade either the broad ligament, or the vaginal wall. The uterus itself was freely movable.

April 20, 1908. Patient in the lithotomy position; the vagina was finally washed out with an alcoholic solution of mercuric biniodide on the table, and the os was plugged with gauze. A circular incision was made around the vagina, one and a half inches below the vaginal reflexion, and this was deepened until the upper part of the vagina hung down as a curtain all around the os; its edges were then firmly sewn together with strong silk, so as to completely enclose the ulcerated surface, two of the sutures, so used, being left long, and serving as tractors upon the uterus during removal. The rest of the operation was carried out in the usual way, the pelvic flaps being as usual reunited above. In this way, every chance of reinfection by the growth was efficiently prevented.

Convalescence was delayed by an attack of broncho-pneumonia, from attacks of which she had suffered for some years, but eventually she entirely recovered and left the hospital seven weeks after the operation. The vaginal vault was completely and apparently soundly healed.

A similar operation can be done from above. Instead of dividing the vaginal walls at the level of the highest part of the fornix, as in the operation for fibromyoma, these walls are freed downwards for a sufficient distance below the os, and then closed by a pair of rectangular forceps, below which they are divided. The uterus is thus protected during removal, or rather the raw surfaces around are thus protected from any infection of cancerous material from the uterus. Some operators close also the lower part of the vagina by a second pair of forceps applied below the first, but stitch these walls together before removing that pair, but it is difficult to see the advantage gained thereby. I prefer to leave the vagina open for the purpose of draining the raw surfaces below the bladder and the connective tissue planes of the broad ligaments, which are opened by the removal of the uterus and upper vaginal wall; the peritoneal flaps are, however, carefully united above.

To sum up, the methods, each of them useful in particular cases for which it is suitable, in vogue at present, are :—

A. *Vaginal.*—Simple excision with preliminary hæmostasis, with or without simultaneous removal of upper vaginal wall. Landau's splitting operation with consecutive hæmostasis, combined or not with morcellation.

B. *Abdominal.*—Simple excision with preliminary hæmostasis, with or without simultaneous removal of upper vaginal wall. Laudau's method of splitting from above with secondary hæmostasis.

Doyen's operation. Kelly's operation, with or without removal of the cervix.

C. *Combined.*—Beginning from the vagina and completing from the abdomen.

THE RADICAL CURE OF COMPLETE PROCIDENTIA OF THE UTERUS, WITH AN ACCOUNT OF A NEW METHOD OF OPERATION FOR THIS CONDITION.[1]

By LAWRIE McGAVIN, F.R.C.S.,

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AMONG the several conditions which surgeons have attempted to rectify by plastic methods, few are able to show so protracted a resistance to these methods as that of complete procidentia of the uterus. A multiplicity of operative procedures, some of them of very considerable ingenuity, have failed, so far as their results are concerned, to justify their being claimed as radical cures, and the surgery of this particular form of displacement is consequently at the present time very far from satisfactory. That the condition is one which urgently calls for attention is clear, not only from the numbers of patients whom one sees, especially in hospital practice, afflicted by it; but from the innumerable pessaries which have been devised, and the enormous mass of literature which has accumulated regarding it.

I have chosen to deal with the subject of prolapse in the most complete degree in which it occurs, because the method I propose to describe was devised especially for that degree, and because lesser degrees may at times be dealt with by less drastic methods; and, lastly, because it has become increasingly the custom to submit these cases to a perfectly unjustifiable mutilation, by the performance of total hysterectomy.

It is interesting to note that, even at the present time, opinions as to the cause of procidentia are still widely divergent, and sufficient difference in this respect exists to warrant the supposition that, whatever the causes may be, no one of them alone is responsible for the trouble, but that all are to some extent at work. Now these causes may be classified into groups, viz., those depending first, on the uterus itself; secondly, on the pelvic floor; thirdly, on the uterine ligaments; fourthly, on the condition of the bladder and rectum; and, lastly, on general increase of intra-abdominal pressure.

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[1] A post-graduate lecture delivered in the London School of Clinical Medicine.

If we consider the uterus first, as being the cause of its own prolapse, we find three conditions of this organ contributing to the trouble; viz., subinvolution from too early convalescence after labour; the presence of fibroid tumours; and the condition known as elongation of the cervix. With regard to the pelvic floor, there is no doubt that repeated pregnancies, at short intervals, especially in women who habitually bear large children, are capable of permanently stretching the vagina, and thinning out the muscular structures of the pelvic diaphragm, till its power is almost entirely lost. Again the loss of the support of the perineal body by rupture is a very potent factor in the descent of the uterus. The uterine ligaments, if stretched, may presumably allow the uterus to become displaced, but this displacement can only contribute to prolapse; it cannot originate it, and, unless some of the other factors are present, the condition will remain as one of ante- or retro-flexion or version, and will go no further.

The ability of the female bladder to retain its contents for a period beyond that which is compatible with its continued healthy action, is well known, and forms a most important factor in the production of prolapse; for it is easy to see that the pressure of a pint and a half of urine, year in and year out, must in time bring about considerable stretching of the anterior vaginal wall; and it is this condition of cystocele, which so frequently precedes the descent of the uterus. The same may be said to some extent of the rectum when habitually overloaded, as is so frequently the case in women. But the attachment of the posterior vaginal wall to the rectum is far less intimate than is that of the anterior to the bladder, and consequently rectocele is less commonly a predisposing cause of prolapse than is cystocele.

The general increase of intra-abdominal pressure, resulting from repeated pregnancy, lifelong constipation, and chronic bronchitis and asthma, although seldom originating a prolapse, is the most potent factor in its establishment when once a displacement has occurred; and there is no doubt that the effect of such pressure is far more serious, when its force is exerted, suddenly and intermittently, over a long period, than when it has remained at much the same degree of tension, or has varied only gradually and gently.

The loss of fat in old women is frequently quoted as a cause of prolapse, but when it is considered that the pelvis is a part in which no very large quantity of fat is commonly found, the inclusion of this loss in the list of causes does not seem very practical.

Whatever the causes may be of this common condition, there is no doubt about the extreme disability which it entails, and, in spite of the late Dr. Matthews Duncan's statement that the patient often complains of very little except the inconvenience of the lump between the legs, I fancy that most surgeons will agree with me, that the frequency of micturition, the bearing down pain, the chronic discharge, the general feeling of lassitude, and, at times, the actual ulceration of the cervix and vagina, constitute a series of real troubles, which most patients consider as rendering life hardly worth living.

As I am only concerned with the treatment, by operation, of this condition, I will not pursue the question of ætiology further, but will briefly consider the many methods which have been employed for the cure or relief of procidentia.

So long ago as 1831, colporrhaphy was suggested by Marshall Hall, and carried out by Heming, but the result appears to have been unsatisfactory. In 1856, Marion Sims attempted the cure of a large procidentia by removal of the anterior wall of the vagina, and, in 1858, modified this by using a V-shaped denudation of the m.m. followed by approximation of the denuded surfaces. This method was also adopted by Emmett, but, in 1862, one of Sims' cases was again operated upon for impaction of the uterus behind the septum formed by the denudation. In 1860, Huguier suggested and practised amputation of the infravaginal cervix, where there was elongation in association with procidentia, and is said to have met with success; and, at this time, perinæorrhaphy was resorted to by Baker Brown, Savage, and others for those cases in which elongation was absent. In all of these operations, it was of course necessary to subsequently support the uterus by means of a pessary; indeed, they may be said to have been done to enable a pessary to be worn, and were therefore operations for relief. Since these early efforts, operations have been, and are constantly being, devised for the relief, or cure of uterine procidentia, and so numerous are they that space and time will only permit of a brief mention of some of them. Wiggin[1] opens the abdomen, pulls up the uterus, and passes a purse-string suture up and down the broad ligaments so as to shorten them up; repairing the perinæum at a later date. Clarence Webster[2] first removes the uterus, and then unites the broad ligaments to the vaginal vault, subsequently performing both anterior and posterior colporrhaphy, Duhrssen[3] first amputates the cervix uteri, and then, by means of an extensive vaginal fixation, completely anteverts the uterus, the fundus being united to the anterior vaginal wall; he subsequently performs a posterior colpo-perinæorrhaphy. A somewhat similar method has been advocated by Berry Hart,[4] but with the addition of an anterior colporrhaphy.

Stanmore Bishop,[5] regarding the sacrouterine ligaments as the essential factors in the support of the uterus, endeavours to remake these by bringing the fornix of the vagina up to the sacrum, the attachment being affected between the rectum and the ureter, the suture picking up the periosteum of the sacrum. Catterino,[6] in 1902, devised what he designated hysterokataphraxis; an operation which consisted in attaching the uterus to the anterior abdominal wall by a series of silver wire sutures passed through the body of the organ. Alexander-Adams operation is so well known that I need hardly draw attention to it, except to say that it is designed rather for retroflexion than for procidentia, and has not proved itself a satisfactory operation for the latter. There remain to be considered the operations of ventro-fixation and ventro-suspension. These operations have been as widely condemned by one section of the profession as they have been lauded by another, and the reason is because different operators look at the question from different points of view. There are those who maintain that the complete, or partial fixation of the uterus in the abdomen, in any position which may give rise to subsequent trouble in the event of pregnancy, is unjustifiable; and possibly such an argument might be a sound one, if only some satisfactory alternative were to hand. In the most advanced cases of procidentia, however, in which the whole utero-vaginal mass, possibly with the accompaniment of a considerable amount of intestine, prolapses on the slightest exertion through the pelvic diaphragm, the only satisfactory alternative to hysterectomy, is some form of fixation. Let us consider the objections to hysterectomy first.

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[1] *Med. Press and Circ.*, Nov., 1901.

[2] *Pacific Med. Journal*, Jan., 1902.

[3] *Centralbl. f. Gynäk.*, 1901, No. 29.

[4] *Brit. Med. Journal*, 1902.

[5] *Lancet*, 1903, March.

[6] *Z'blatt. f. Gynäk.*, 1902, No. 26.

In the first place, it is an operation which must be classified among the mutilations of surgery; that is to say, it is one involving the removal of a portion of the body which is not in itself actually diseased, for the simple reason that we are unable to rectify the displacement. This is simply another way of saying that it is bad surgery. Again, it is an operation of undoubted severity, having a much higher mortality than published statistics affirm. I have not yet come across the surgeon, who is willing to benefit the human race to the extent of unreservedly publishing his surgical disasters, and I am convinced that, if such publication was the rule, the mortality statistics of all abdominal operations would be found to be much higher than has hitherto been supposed. Thirdly, the removal of the uterus does not always result in the cure of the whole trouble, since it is no uncommon thing for the vagina, rectum, and bladder to prolapse, often carrying with them some coils of intestine; and this may be said to be an almost incurable condition, since the presence of the uterus is, as I will show later, an essential element in the cure of procidentia. Fourthly, the operation may at times be called for in the case of women in the child-bearing period, and although few operations for complete procidentia can, owing to the peculiar anatomical attachments of the uterus, be entirely satisfactory from the point of view of the prospective mother or of her attendant accoucheur, it is preferable to some women, and imperative to others, that they should face the difficulties of a confinement, complicated by a fixed or suspended uterus, rather than forgo, for all time, the chance of motherhood by submitting themselves to a hysterectomy. Lastly, every surgeon of experience must have come across those trying cases of confirmed neurosis, which are not uncommonly the outcome of hysterectomy, even where the ovaries have been retained. They are often the subjects of chronic melancholia, hypochondriasis, and morbid neuro-vascular phenomena, and are exceedingly difficult to deal with.

To return to the question of fixation and suspension of the uterus ; there is no doubt that these operations have proved themselves to some extent satisfactory in cases of slight prolapse, and that they are equally as unsatisfactory in cases of complete procidentia, especially where this is complicated by chronic asthma or bronchitis. The idea of hysteropexy was first evolved by Lawson Tait, who attached the fundus uteri to the abdominal peritoneum by simple suture. Since that time, the method has been modified in various ways by many workers, and has at last come to include two different procedures, one being ventro-suspension, an operation in which a flexible attachment is formed between the fundus and the abdominal wall; and the other ventro-fixation, in which a broad and firm union is created between the anterior surface of the uterus and the abdominal wall. What are the objections to them ? In the first place, it may be said that in a very large proportion, recurrence is eventually seen ; secondly, a dead space is left, which is bounded behind by the cervix and vagina, below by the fundus of the bladder, and in front by the pubes, and through this small space intestine may pass and become strangulated ; thirdly, the inability of the uterus to accommodate itself to the alterations of position, demanded by pregnancy, renders the patient liable to miscarriage, abortion, and to difficulties in her confinement.

Now with regard to recurrence, it is clear that if the uterus has been fixed, or suspended, at the fundus, it can only return to its prolapsed condition by the stretching of the false ligament (Fig. 1) which has been formed ; and this stretching has been purposely aimed at in ventro-suspension, in order to permit of the expansion and rising of the uterus which takes place in pregnancy. The theory is of course reasonable, but the results are disappointing, and the danger of this " fundal " or suspensory ligament have been referred to by Taylor,[1] who says, " Nor is this danger merely a theoretical one, for fatal cases of intestinal obstruction, due to such a band formed after hysteropexy, have been recorded by Olshausen, Jakobs, Kreutzmann, Wallace, and others." It must be remembered that the artificial ligaments, produced by the surgeon, differ from those

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[1] THE PRACTITIONER, 1907, p. 793.

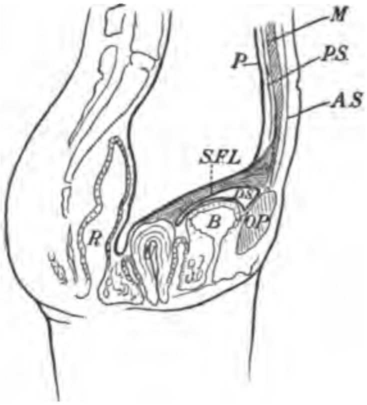

Fig. 1.—*Diagram showing stretched fundal ligament and uterus again prolapsed.*

U. Uterus. B. Bladder. R. Rectum. D.S. Dead space beneath. S.F.L. Stretched fundal ligament.

produced by Nature in one very important respect, viz.:—they are much more prone to stretch when any tension is applied to them continuously. In the case of the fundal, or suspensory ligament of the uterus, two results are seen; one is that the dead space, referred to above, is rendered larger, and the other is that the upper boundary, in place of being formed by a solid rounded body like the uterus, is now composed of a narrow bridle-like band, which becomes a serious danger to the intestine, partly because it is within easier reach of the latter, and chiefly because it is around such narrow and cord-like bridles that kinking and strangulation so frequently take place. That these false ligaments are capable of almost indefinite increase in length, is proved by the fact that peritoneal bridles have been found several inches in length, during the course of abdominal sections done for various conditions. The formation of a fundal ligament thus frequently defeats its own ends, by permitting the uterus to sink gradually to its old faulty position. The dead space is, I believe, of itself of little real danger; it is low down in the pelvis, and if the uterus is well drawn upwards, and the vagina straightened out, there is small chance of the intestine being caught beneath it, where no fundal ligament is present. Indeed, post-mortem records show us very clearly that the proportion of cases of strangulation by band, to the cases, in which bands are found without any history or evidence of strangulation, is a very small one. The danger then depends rather on the character of the band than on the fact of its existence.

With such a radical alteration in the anatomical circumstances of the uterus, it would be unreasonable to expect that the phenomena of labour should be carried out with the same facility as in the normal womb. It is, however, a fact that such a fortunate state of affairs is at least possible; for Guerard,[1] referring to ventro-suspension, mentions the fact that, in 53 women, in whom this operation had been performed, there were 57 births; of these, 52 were spontaneous deliveries of which only 7 were abortions; while forceps were required in only 5. Ventro-fixation, however, is probably attended by a higher percentage of premature deliveries, and Maly[2] refers to two cases in which repeated pregnancies occurred, resulting in abnormal deliveries, usually of asphyxiated children. He does not, however, entirely condemn the method, which, in certain circumstances, offers great advantages to the sufferer.

Granting, then, that ventro-fixation and ventro-suspension have their uses (and in these extreme cases of procidentia, these operations, although by no means ideal, are yet preferable to the performance of hysterectomy), I would suggest for consideration how far they can be turned to really practical account. As at present performed, these operations are undoubtedly prone to fail in their object, owing, as I have already pointed out, to the tendency of the fundal ligament to stretch. It is, I think, reasonable to suppose, that if the uterus could be brought to such a height as would cause traction to be exerted upon the vaginal walls, and so upon the contiguous walls of the bladder and rectum, and securely fixed there, not only would the procidentia be permanently cured, but to a very great extent the co-existent cystocele and rectocele would be relieved, if not actually cured also. In considering this question recently, I came to the conclusion that the first essential for success was the formation of some ligament which should be absolutely unstretchable; the second, that this ligament should be intimately incorporated with the uterus itself, on the one hand, and with the abdominal wall, on the other; and the third, that the period of convalescence should be sufficient for the firm consolidation of this ligament; and, lastly, that the operation for its manufacture should be one of no great severity. This operation, the details of which I am about to explain, was primarily designed for dealing with cases of complete procidentia in women past the child-bearing age, and I propose to discuss presently the justifiability, or the reverse of the method, as applied to women of other ages.

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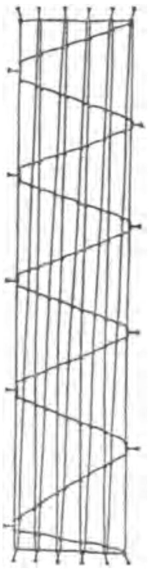
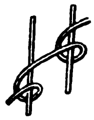
[1] *Monats. f. Geb. und Gyn.*, 1904, 2.

[2] *Zeut. f. Gynak.*, Jan., 1904.

In the first place, there is no tissue in the human body from which such a ligament as that which I have mentioned can be constructed; this being so, it is necessary to provide some accessory material which will render the ligament to be made, incapable of stretching. The work, which I had already done in the cure of ventral hernia, by means of filigrees of silver wire, suggested to me the possibility of applying this substance





Method of making the zig-zag.

Fig. 2.

Flexible silver wire filigree used in these operations (not drawn to scale).

in these cases of procidentia, and of devising some form of backbone, which could be incorporated in the ligament which I desired to produce, and which would effectually prevent any tendency of that ligament to stretch. As the result of experiment, I produced a filigree (Fig. 2), measuring nine inches in length by one in breadth, the almost parallel wires being united by a single strand of wire running in a zig-zag manner the whole length of the filigree. The gauge of wire used was the same as that which I have been in the habit of employing for the manufacture of filigrees for the cure of ventral hernia, viz., 28-standard wire gauge.

The operation itself is a combination of ventro-fixation and ventro-suspension, and is carried out as follows:—

The abdomen is opened in the middle line above the pubes by a wound, which is just sufficient to permit of the uterus being drawn from the abdomen. The intestines are kept out of the way by gauze packing, and a fine wire suture is passed transversely through the parenchyma of the uterus, on the anterior surface on a level with the round ligaments, care being taken not to enter the uterine cavity. This suture is for the present used as a means of dragging the uterus up into the wound. A transverse incision is now made (*a*, 3, 4, *a*, Fig. 3) through the peritoneum on the dorsal aspect of the uterus near the fundus, and from the centre of this, a second incision is made vertically along the centre of the dorsum to *b*, so that the two flaps P^1 P^1 can be raised, these consisting of peritoneum and a slight thickness of uterine muscle, since the peritoneum

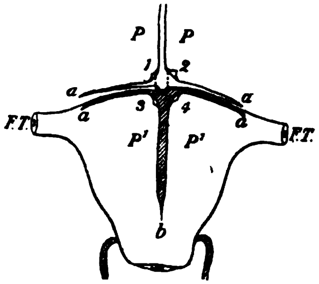


Fig. 3.—*Diagram to show method of incising the dorsal aspect of the uterus and parietal peritoneum in order to turn back the flaps P^1 P^1 of the former and P P of the latter. F.T. The Fallopian tubes.*

here is inseparable from the muscle. The inevitable oozing is checked by pressure, and one end of the filigree is placed on the dorsum of the uterus, reaching as low as the back of the cervix, and, being sutured at one or two points to the raw surface, is covered by the reflected flaps (R.P.U., Fig. 4) which are united

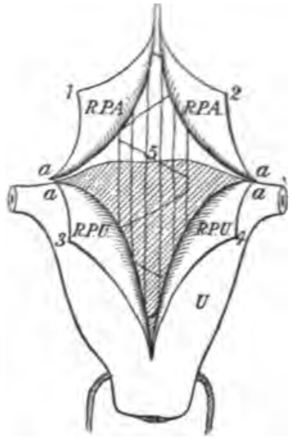


Fig. 4.—*Dorsal aspect of uterus and abdominal wall showing uterine flaps R.P.U. and peritoneal flaps R.P.A. raised and filigree in position. When sewn down their points* 1, 2, 3, 4, *will meet at* 5 ; 1 *a*, 2 *a meeting the edges* 3 *a and* 4 *a as shown in Fig.* 3.

again over it. The fundus is now pulled as high as possible, and, at this level, the peritoneum of the abdominal wall is incised transversely (*a*, 1, 2, *a*, Fig. 3) so that the flaps (R.P.A., Fig. 4) may be raised. The silver wire, hitherto used as a tractor, is passed through the tissues of the abdominal wall with the exception of the skin and peritoneum, on either side of the abdominal wound, and the uterus is thus moored in position. The filigree must now be turned forward out of the abdomen, and, by a suture of catgut, the edges 1 *a* and *a* 3 of the flaps R.P.A., R.P.U., are united, as are also the edges 2 *a* and *a* 4 of the flaps on the opposite side. Thus the points 1, 2, 3, 4, of these flaps all meet at the point 5 (Fig. 4) behind the filigree. The abdominal peritoneum being now closed in its whole length, the filigree is carried upwards upon it to a point (K., Fig. 5) half-way to the umbilicus, and the recti muscles are brought out of their sheaths and united over it. At the point mentioned, the filigree is bent forwards between the muscles, and being laid upon their anterior surfaces, is sutured to them at one or more points. The suturing of the muscles is then finished above the point of emergence of the filigree, and finally the latter is completely buried by the union of the anterior sheath of the muscles over it. The filigree thus comes to lie from within outwards, (*a*) in the uterine body, (*b*) between the peritoneum and the posterior surface of the rectus muscle, (*c*) between the rectus muscle edges, (*d*) between the rectus muscle, and its anterior sheath (Fig. 5).

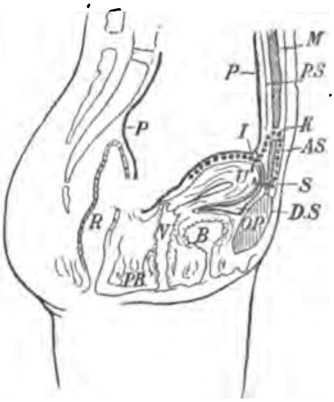


Fig. 5.—*Diagram to show position of filigree, shown by dotted line, at completion of operation.*

U. Uterus. B. Bladder. P.B. Perineal body. O.P. Pubes. A.S. Anterior sheath of rectus. P.S. Posterior sheath of rectus. M. Rectus muscle. P. Peritoneum. D.S. Dead space. I. Transverse incision shown in Fig. III. as a, 3, 4, a. S. Retention suture.

The immediate result of this operation is the formation of a perfectly unstretchable union between the uterine fundus and the abdominal wall; for the growth of new vessels, through the strands of the filigree, is quickly effected, and the result is a firm fibro-metallic ligament.

Before discussing the possible objections to the procedure, and I am far from claiming for it that it is ideal, I would firmly impress upon you, that it was designed to deal with cases which have hitherto been shown to be practically incurable; that it is an attempt to establish a radical cure without the mutilation of hysterectomy, and devoid of its dangers; that, although, in certain circumstances, it may be used for patients in the child-bearing period, *it was not originally intended for such patients,* but rather for those who had passed that age, and whose lives were rendered a burden by their condition. In them, there can, so far as I can see, be no reasonable objection to the method, but it remains to be seen whether the concomitant troubles of prolapse of the vaginal and rectal walls, which are commonly present in these cases, will be entirely controlled by the operation. Personally I believe that they will in many cases, since an important factor in their increase, and possibly in their occurrence (for they certainly are not always a primary cause, as has been suggested), is absent; this factor is that of chronic congestion, which is brought about by the presence of the uterus in the vagina, and by the pressure of large Zwanke's or ring pessaries. Replace the uterus, remove the pessary, and give the patient a sufficiently prolonged convalescence, compelling her to be regular in her habits, and, in a great many cases, the tone of the bladder and rectal walls will be recovered, and the cystocele and rectocele will disappear.

It has been suggested to me that these cases will ultimately show considerable elongation of the cervix. This is, I think, a theoretical rather than a practical objection; it might occur, in cases of chronic pulmonary trouble, owing to persistent coughing and wheezing, and, in such cases, might possibly be accompanied by some return of cystocele or rectocele; the main trouble, however, would not return, that is, the procidentia, and it was for this that the operation was intended.

That this latter statement is somewhat dogmatic, I am quite prepared to admit, but experience, gained in the use of filigree in the abdominal wall, has shown me that these combinations of fibrous tissue and silver wire are perfectly unstretchable, and it is therefore in the highest degree improbable that the uterus would again prolapse after such treatment.

It is now more than a year since I first submitted a patient to this method in this hospital. She was a spare woman, of 47 years of age, who had suffered for many years from procidentia of the most complete type. On rising out of her chair, the whole mass formed by the uterus, and inverted vagina, with a considerable amount of the rectal and bladder walls, immediately prolapsed through the vulval orifice. She was quite unable to empty her bladder unless she first replaced the mass, and even then there remained a large quantity of residual urine, the result being a constant desire to pass her water, which, if not actually septic, was loaded with urates and mucus. Hysterectomy had been suggested to her elsewhere as the only possible cure, but this she refused, and she consented to submit herself to the operation I have described. This was carried out under the influence of spinal analgesia. Since this operation was done, I have seen the patient many times; not only has her uterus remained in the position in which I placed it, but it has done this in the absence of any external support whatever, and in spite of the fact that this patient suffers in such a marked degree from asthma, that during her convalescence she had to be kept in the semi-recumbent posture. Further, she has entirely lost the trouble with her bladder, and has no elongation of the cervix.

Now with regard to the question of this operation in the child-bearing period of life; I cannot say that I would *never* do it, because I *have* done it; but I would say that it is not intended for such cases, and should only be done in the following circumstances: (*a*) where the patient's existence is rendered perfectly miserable, in spite of the use of pessaries; (*b*) when she has earnestly begged for relief, but refuses to part with the uterus, and has consented either to submit to sterilisation at the time of operation, or to take the fully explained risks of pregnancy.[1]

My last two cases were both of the child-bearing age, one being 30 and the other 39, and both urgently requested that something should be done, and, after full explanation of the possible dangers, said they preferred to accept the risks of pregnancy rather than to part with the uterus.[2]

Let us consider for a moment what are the possible risks. I have already said that my operation is a combination of ventro-fixation and ventro-suspension; indeed, it is rather of the nature of the latter, and therefore, other factors being absent, Guerard's statistics should apply to it; but the factor, which must be especially considered, is the presence of the filigree in the actual substance of the uterus. Presuming pregnancy to ensue, the following possibilities must be considered. (*a*) The patient might abort owing to the inability of the uterus to rise from the pelvis; (*b*) she might miscarry as the result of the failure of the posterior wall of the uterus to expand; (*c*) pregnancy progressing undisturbedly, she might arrive at full term and suffer difficulty in delivery, owing to pressure of the os uteri upon the promontory of the sacrum, the child being asphyxiated; (*d*) under the same supposition, where a living child was greatly desired, it might be necessary to deliver by Cæsarian section; (*e*) there is the bare possibility that, during the pregnancy, the uterus might exert sufficient tension upon the filigree to rupture it; this, however, is very unlikely.

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[1] *Cf.* Ritchie: *St. Paul Med. Journ.*, Aug., 1904.

[2] The result in both of these cases has been so far perfectly satisfactory; it is however, as yet too soon to form any definite opinion as to permanence of cure.

The fact is, that until such an eventuality has arrived it is impossible to say exactly what would be the immediate result of the presence of the filigree upon the pregnant uterus. I should be inclined to think that nothing very serious would result; if, however, it is thought that the restriction of the expansion of the posterior wall of the uterus is an element of danger, I see no reason why the filigree should not be placed in the anterior in place of the posterior wall.

As to the difficulties of the operation, they are not great; the persistent oozing from the uterine tissue is the worst of them, for it must be remembered that the uterine flaps should be of sufficient thickness to carry their own blood supply; they are more easily fashioned by the use of curved scissors than with a scalpel, and this certainly causes less bleeding.

Convalescence must on no account be hurried, and it is my rule to keep these patients in bed a clear month from the time of operation, and to insist upon rest upon a couch, or, at least, with the legs raised, for another month, great stress being laid upon the importance of never allowing the bladder to become the least distended, nor the rectum to remain unemptied.

Finally, this operation is still in the experimental stage, and some time must pass before a decided opinion can be expressed as to its merits or the reverse; should it, however, be successful, it will, I believe, bring comfort to thousands of women, who for years have been faced by the, to them, disgusting alternative of wearing some exaggerated form of vaginal instrument, or of undergoing the unsexing and somewhat dangerous operation of hysterectomy.

[1] For the diagrams accompanying the above, I am much indebted to the pen of Dr. Ernest Jensen.

A REVIEW OF FORTY-SIX CONSECUTIVE CASES OPERATED UPON FOR CHOLECYSTITIS.[1]

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THE following remarks are founded upon an experience of forty-six consecutive cases operated upon for cholecystitis.

With two exceptions, gall-stones were found present in the gall-bladder or bile ducts. A large percentage of these patients were operated upon for symptoms which suggested a serious intra-abdominal condition, and were more or less emergency cases. In 50 per cent. acute infection had occurred, and suppuration in the gall-bladder was found at the time of operation.

An analysis of the forty-six cases showed the following conditions :—

TABLE I.

		Cases.
(1) Acute cholecystitis - - - -		15
Stones found in the gall-bladder only.		
(2) Acute cholecystitis - - -		6
Stones both in the gall-bladder and cystic duct.		
(3) Chronic Cholecystitis - - - -		15
Stones found in the gall-bladder or cystic duct.		
(4) Stones in common bile duct - - -		6
(*a*) With acute suppurative cholangitis -	3	
(*b*) Impacted - - - -	1	
(*c*) Non-impacted - - -	5	
(5) Acute suppurative cholecystitis - -		1
No stones present.		
(6) Cancer of gall bladder - - -		2
Gall-stones present—		
(*a*) Suppurative cholecystitis - -	1	
(*b*) Non-suppurative cholecystitis -	1	
(8) Acute perforating ulcer of gall-bladder -		1
No stones found.		
		46

Sex.—In this series there were 40 females and 6 males.

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[1] A clinical lecture delivered at the London Hospital.

It is usually found that cholecystitis occurs much more commonly in females, and most authorities give the ratio, Females : Males : : 5 : 1.

The acute suppurating cases, with but one exception, occurred in females.

Age.—It is of interest to note that a large proportion of these patients were comparatively young. No less than 7 were under 30 years of age. Two of them were aged 20. In several of these, fairly large gall-stones, which had probably been in process of formation for years, were present. It is impossible to say how long gall-stones take to become formed, but it is well known that they have been found at birth, during childhood, and in young adults.

The age incidence in this series was as follows :—

TABLE 2.

Years of Age.	No. of Patients.	
Between 20–30	7	Suppuration in all.
Between 30–40	7	Suppuration in 2 cases.
Between 40–50	11	Suppuration in 6 cases.
Between 50–60	11	Suppuration in 3 cases.
Between 60–70	9	Suppuration in 6 cases.
Over 80	1.	

SYMPTOMS.

When Stones were present in Gall-bladder and Cystic Duct.—The majority of these patients gave a history of recurring attacks of pain referred to the gall-bladder region. It is difficult to say whether these were attacks of true biliary colic, or pains due to periods of catarrhal cholecystitis; the distinction between the two conditions is not easily obtainable from the average hospital patient. Slight transient jaundice was sometimes, though not frequently, noticed.

In 22 cases, stones were found in the gall-bladder only, associated with varying degrees of cholecystitis. In 14 of these there had been a history of recurring attacks of pain extending over a period of from one month to several years, the final attack being, as a rule, the most severe one. In the remaining 8 patients the present attack had been the only one noticed, with a previous history of good health.

In 6 cases the symptoms complained of were gastric in character. There were pain and discomfort in the epigastrium after food, with occasional attacks of nausea and vomiting. In one patient, a male, aged 41, discomfort after food, relieved by alkalies, or vomiting, was the most noticeable symptom. This had lasted for 10 years until three attacks of biliary colic without jaundice led to an exploration of the gall-bladder. This patient gave a history of "hunger pain" which was so typical that the diagnosis of duodenal ulcer was considered. A much thickened gall-bladder, containing large stones and pus, was found and removed.

A continuous dull "ache" may be the only symptom of stones in the gall-bladder. This "ache" may radiate to either shoulder, front of the thorax and region of either breast. In one patient, a gentleman aged 44, an epigastric ache referred to the left shoulder, and varying in intensity was the only symptom. The gall-bladder, in this case, was found filled by 240 stones, removal of which entirely relieved the pain.

The association of gastric disease with stones in the gall-bladder is comparatively common, and leads to difficulties in the interpretation of symptoms. In the case of a female, aged 49, transferred from Dr. Bertrand Dawson's Ward in the London Hospital, in 1904, the symptoms were those of pyloric stenosis complicated by gall-stone colic. Absence of free HCl in the stomach contents, with evident wasting, suggested carcinoma. An operation showed a much thickened gall-bladder containing stones, the pylorus was involved in a growth, which appeared to originate about the neck of the gall-bladder, and the stomach was dilated. Removal of the stones gave temporary relief, but the patient only lived three months after leaving the hospital.

It is well known that stones may be present in the gall-bladder for long periods, and give rise to no symptoms which may suggest their presence. Acute infection of the gall-bladder gives rise to the symptoms of peritonitis, generally limited to the right upper quadrant of the abdomen, the diaphragmatic movements are impeded, giving rise to "jerky" and painful respirations. In the ultra-acute cases, symptoms of generalised peritonitis may rapidly supervene.

The Symptoms of Stones in the Common Duct were in this series illustrated by six cases.

In three patients, incomplete impaction of the stone was associated with symptoms of acute septic cholangitis, and two ot these patients succumbed after removal of the stones and drainage of the duct, whilst one recovered. In one patient, incomplete impaction of stones in the common duct had caused a pulmonary biliary fistula. In only one case had the stone become completely impacted, giving rise to complete and persistent jaundice. The patient was an old lady of 81, and removal of the stone was followed by complete recovery.

Jaundice.—This was absent in the majority of the cases. In 30 there had never been any history of jaundice. It is important to remember that the absence of jaundice in no way negatives a diagnosis of stones in the gall-bladder and cystic duct.

Physical Signs.—Signs in the abdomen indicative of stones in the gall-bladder or ducts are only present, if—

(1) The gall-bladder is palpable owing to distension by fluid or stones;

(2) Acute infection is present.

The large distended gall-bladder, with impaction of a stone at its neck, or in the cystic duct, gives rise to a well-defined and easily recognised tumour. This tumour is prominent, superficial, and feels to be placed immediately underneath the anterior abdominal wall. The right loin, unless effusion is present, is tympanitic, and not occupied by the tumour. The percussion note, obtained over a distended gall-bladder, is rarely an absolutely dull one, but is an impaired resonance, continued upwards and merging without any interval into the flat dulness of the liver.

The size of the tumour produced by a distended and inflamed gall-bladder is often remarkable. In one patient (No. 27) the tumour could be easily seen on inspection pushing forward the abdominal wall and apparently occupying the right half of the abdomen. In the acute cases the surrounding intestines, especially the colon and the omentum, become adherent to the gall-bladder, and materially add to the size of the tumour.

It is well recognised, as a clinical fact, that the older the patient and the longer the history the less likely are we to find any physical signs in disease of the gall-bladder. If the gall-bladder is much thickened from long-standing irritation by stones, and acute infection occurs, dilatation does not occur, and a tumour is absent. In these cases a rigid rectus muscle on the right side, hyperalgesia of the skin over the gall-bladder region, and Murphy's sign are generally present.

It must be remembered that pyrexia may be altogether absent, even when acute infection occurs in a chronically thickened gall-bladder. In three cases suppuration was found in a thickened gall-bladder containing stones, and the temperature had remained normal throughout the illness.

Diagnosis.—The diagnosis of cholecystitis can, as a rule, be made without much difficulty. The actual presence of gall-stones can only be inferred if they have caused any obstruction to the ducts, or have been passed in the fæces. The cases which give rise to most uncertainty of diagnosis are tumours or gumma of the liver associated with attacks of pain and jaundice. Pancreatic diseases which occlude the common bile duct give rise to a definite clinical picture easy of recognition. In a young subject one is apt to forget that an acute abdominal trouble may be caused by gall-stones, and to look upon the appendix as the offender in every case. The class of gall-stone case associated with the gastric type of symptoms is always difficult of diagnosis, and suggests the possibility of gastric or duodenal ulcer.

In elderly patients, there is often difficulty in deciding whether or no malignant disease co-exists with the acute inflammation of the bile passages. In any case of doubt it is a good rule to advise exploratory operation. Chronic infection of the gall-bladder with gall-stones may, in an old patient, lead to symptoms and signs very suggestive of malignancy. I have operated on one patient in this series when, although the prognosis appeared hopeless, an operation revealed an impacted and thickened gall-bladder with stones and absence of malignant disease. Marked loss of weight and strength with enlargement of the liver was present. Absence of nodulation of the liver and of ascites are hopeful signs. Sometimes the onset of malignant disease is quite gradual and symptomless, until acute infection supervenes, and the real state of affairs is revealed at the operation. In patient No. 38, cancer was unsuspected, an acutely inflamed gall-bladder, containing pus and stones, was drained, but the liver was found to be riddled with carcinomatous growth. Gumma of the liver, associated with attacks of pain due to perihepatitis, in the following case, led to an erroneous diagnosis of gall-stones. A bus driver, admitted into the Poplar Hospital under my care, gave a history closely resembling gall-stone colic. An examination of his abdomen revealed a rounded swelling projecting from the lower border of the liver exactly in the position of the gall-bladder. On the abdomen being opened, the falciform ligament of the liver came into view stretched out transversely. Beneath this the smooth rounded swelling proved to be a portion of the inferior margin of the left lobe of the liver. This protuded forwards and downwards as the result of the scarring of gummata adjacent to it. The left lobe of the liver was so enlarged that the gall-bladder was displaced far over into the right loin, and could hardly be reached by the fingers inserted into the incision in the right semilunar line. In this case the history and physical signs were most misleading.

Conditions found at Operation.—(1) There were eight cases of acute recent suppurative cholecystitis associated with gall-stones. In some of these the gall-bladder was enormously distended, due to impaction of a stone at its neck. The wall of the gall-bladder showed various stages of acute inflammation. The mucous membrane in some cases was ulcerated, sloughing, or cast-off in membranous shreds. There was no instance of gangrene of the gall-bladder in this series.

Cholecystostomy was done in six of these cases, the stones being removed and the gall-bladder drained. One of these patients died of acute dilatation of the stomach three days after the operation, the rest recovered. In two cases cholecystectomy was done, one of these patients died of acute pneumonia on the seventh day. The previous history in all these cases was that of a short acute illness.

(2) Acute suppurative cholecystitis without stones. In one case, a Jewess, aged 54, operation revealed an acute phlegmonous cholecystitis. No gall-stones could be found either in the gall-bladder or any of the bile ducts. The condition was probably due to an acute ascending infection from the duodenum. Drainage of the gall-bladder was followed by recovery, but a troublesome sinus persisted for some time.

(3) Acute perforation of the gall-bladder. In one case

the rare condition of an acute perforating ulcer of the gall-bladder without gall-stones led to general peritonitis with a fatal ending. A good account of this case with diagrams of the microscopical appearance of the ulcer was published by Dr. Worthington in the *Archives of the Pathological Department of the London Hospital* (No. I., Vol. I.). At the operation, general peritonitis was found with a collection of bile-stained fluid in the right iliac fossa, the opening in the gall-bladder was not detected as it had been sealed off by lymph.

(4) Chronic perforation of the gall-bladder. This was found to have taken place in one case (No 1). The stones had ulcerated through the wall of the gall-bladder, and lay in an abscess cavity in the liver substance.

(5) Chronic cholecystitis with acute infection. There were altogether thirteen examples of this condition in this series. In every case a long history was obtained of recurring attacks of colic or pain sometimes associated with jaundice. Operation revealed a greatly thickened and adherent gall-bladder containing thick pus and stones.

Cholecystectomy was done in eleven out of the thirteen cases. One of these patients died of septic pneumonia six days after operation. The rest, with one exception, made good recoveries. In this patient a large stone impacted at the neck of the gall-bladder had ulcerated into the wall of the common duct. The gall-bladder was removed and a ligature applied to the wall of the common duct. Symptoms of obstructive jaundice supervened. Five weeks later the common bile duct was exposed and found to be occluded by cicatricial tissue. A drainage tube was passed into the right hepatic duct. The symptoms were not relieved. At a subsequent operation by another surgeon, the hepatic ducts were freely drained, and, after a long illness, the patient made a good recovery.

In two of the thirteen cases cholecystostomy was done, one of these patients died of acute lobar pneumonia three weeks later, the other recovered.

(6) Impaction of a gall-stone in the cystic duct. This occurred in eleven cases. In five of them great distension of the gall-bladder with mucus took place, in six suppuration supervened.

In the non-suppurative cases, cholecystectomy was twice required, as the stones were firmly impacted in the duct, and could not be dislodged. In one case a stone was extracted after the incision of the cystic duct (Cysticotomy); this was followed by a persisting sinus which has now lasted for six years, the patient refusing further treatment.

"In every case in which a stone was found impacted in the cystic duct with suppuration, removal of the gall-bladder was found to be necessary."

In one case (No 19), impaction of the stone in the cystic duct was the cause of an acute ulcer with perforation and formation of an abscess outside the duct.

From the experience detailed above it would appear that impaction of stone in the cystic duct usually demands cholecystectomy.

(7) Stones in the common bile duct. This condition was found present six times. With one exception the patients were over 50 years of age, and gave long histories of colic and biliary symptoms.

The youngest patient, a woman aged 28, died from lobar pneumonia 20 days after operation. In another case acute infective cholangitis was present, and removal of the stones with drainage did not avert a fatal ending. In an old lady, aged 81, a large impacted stone was found. Deep jaundice, wasting, and pain were present. Removal of the stone was followed by a good recovery. A man, aged 57, had many small stones in the cystic, common, and hepatic ducts, those in the hepatic duct were scooped down through an incision made in the common duct. This is a rare condition, and only found by Kehr three times in 547 operations.

One of these six patients, a woman aged 50, developed a pulmonary biliary fistula before admission to hospital. This case was recorded in the *British Medical Journal* of August 8, 1903. Removal of two stones from the common duct led to a complete cure of the fistula.

With regard to the position of the stones, they were, with two exceptions, situated in the supraduodenal portion of the duct. One was impacted at the ampulla of vater. This was removed through an incision made in the duct above the duodenum, by forceps passed down to the papilla. In another case a stone placed just above the papilla was displaced upwards by the fingers and removed from the accessible portion. From a comparatively small experience, I am inclined to think that transduodenal or retro-duodenal operations for this condition should be avoidable.

(8) Carcinoma of the bile tracts. There were only two cases of carcinoma found in this series. One of these patients had suppurative cholecystitis, with many stones, in addition to carcinoma of the gall-bladder, with secondary deposits in the liver.

In any series of acute inflammatory conditions of the gall-bladder, the possibility of implication of the pylorus would be expected. This occurred only once. In a lady, aged 28, a greatly thickened suppurating gall-bladder containing stones was removed. On the eleventh day after operation severe and persisting vomiting took place. Six days later, signs of gastric dilatation and pyloric obstruction became evident. The abdomen was opened in the mid line, and the stomach found dilated and much hypertrophied. The pylorus was bound up in a mass of inflammatory adhesions. A posterior no loop gastro-enterostomy was made, and the patient made a good recovery. She is now in good health, two years since the operation.

Implication of the pylorus with carcinoma, secondary to the gall bladder, led to stenosis of the pylorus. This case has already been referred to. Acute gastric dilatation occurred in one case three days after cholecystostomy.

Statistics of acute gastric dilatation, following operations on the abdomen, show that the largest number of cases follow operations on the bile tracts.

Treatment.—The experience gained from these cases has suggested certain lines of treatment depending on the condition found at the time of operation. Where the presence of gall-stones in the gall-bladder is undoubted, but without acute symptoms, the stones had better be removed, and the operation strictly limited to their removal. The mortality of cholecystostomy with removal of the stones is so small, and the possibility of recurrence of stones so slight, that surgical treatment may be safely recommended. When infection has taken place, or a stone has become impacted, then the question of treatment by operation becomes urgent, but exactly what operation to carry out in each individual case is not always an easy matter to decide. It may be advantageous to review, in the following table, the usual conditions found, and to suggest what should be done for their relief.

TABLE 3.

Condition.	Treatment.
(1) Gall-stones are present in the gall-bladder only, associated with acute cholecystitis. The gall-bladder is acutely inflamed, but there is no marked distension, and no gross change in its wall.	Removal of the stones with drainage of the gall-bladder.
(2) Gall-stones are present in the gall-bladder with acute cholecystitis. The wall of the gall-bladder is so affected that abscess, sloughing, or gangrene has occurred. No symptoms of cholangitis are present.	Remove the stones and the gall-bladder. Ligate the cystic duct, after examination of the common duct. Provide drainage.
(3) Stones are found in the gall-bladder with impaction of a stone at its neck. There is much distension or alteration in the wall of the gall-bladder. Symptoms of cholangitis are absent.	Romove the gall-bladder and stones. Ligate the cystic duct.
(4) Stones are present in the gall-bladder and the cystic duct. There is no marked alteration in the wall of the gall-bladder other than acute inflammation.	If possible remove stones and drain gall-bladder.
(5) Stones are present in the gall-bladder and cystic duct. There is much distension or alteration of the wall of the gall-bladder.	Remove the gall-bladder and ligate the cystic duct, in the absence of cholangitis and implication of the common duct.

(6) If stones are impacted in cystic duct and cannot be removed.	Remove the gall bladder, ligate the cystic duct.
(7) The gall-bladder is much thickened, contracted, and adherent, and contains stones without acute infection.	Drainage with removal of stones. If impossible, remove the gall-bladder and stones, and ligate the cystic duct.
(8) The gall-bladder is much thickened, contracted, and adherent, and contains stones plus suppuration.	If possible, drain the gall-bladder after removing the stones. If impossible, remove the gall-bladder, and drain its neck through the cystic or common ducts.
(9) Stones are present in the common duct.	Remove the stones and drain the common duct. Drain the gall-bladder, if necessary, but do not remove it.
(10) Growths of the gall-bladder.	Cholecystectomy whenever possible.

The nature of the operations performed on these 46 cases, and the mortality, is shown in the following table:—

TABLE 4.

Operation.	Number of Cases.	Mortality. Cause of Death.	No.
Cholecystostomy -	25	1. Acute gastric dilatation - 2. Lobar pneumonia 3 weeks after operation. 3. Carcinoma, 11 weeks later. 4. „ 7 „ „	4
Cholecystectomy -	17	2. Septic broncho-pneumonia - 1. Peritonitis.	3
Choledochotomy -	6	Acute suppurative cholangitis -	1
Cysticotomy - -	1		

In four cases a second operation was necessary:—

Cholecystectomy	after cholecystostomy	2	No mortality.
Choledochotomy	„ cholecystectomy	1	„
Cysticotomy	„ cholecystostomy	1	„
Gastro-enterostomy	„ cholecystectomy	1	„

CHOLELITHIASIS: ITS EARLY RECOGNITION AND EARLY SURGICAL TREATMENT.

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THOSE who have been much engaged in the surgical treatment of the various disorders of the biliary system during recent years are ready to acknowledge that much of their work has dealt with the later manifestations, the complications, and the sequels of gall-stone disease. A review of a series of operations will disclose the fact that, in many, if not in all, the pathological changes laid bare were of an advanced character, and were an evidence of undeniable importance as to the protracted character of the disease. We have been operating, that is to say, upon our patients, not because they were suffering from cholelithiasis, but because the stones, which had long been present in the gall-bladder, had given rise to advanced pathological changes, which were altogether incompatible with life, or which rendered life intolerable. The reason for this is not difficult to discover. The text-books of medicine, and indeed the works which deal especially with these topics, do not describe with any details, or with accuracy, the symptoms which are to be recognised in the early stages of cholelithiasis. They make mention only of the later symptoms, of colic, of jaundice, and so forth. With all the knowledge which such works can give, a diagnosis of gall-stones may never be made with confidence, until tardy complications have arisen, for it is these alone which are considered characteristic of cholelithiasis; it is these alone which are said to afford a trustworthy indication of the presence of stones. We are on the eve of better things. The surgeon, who has operated upon a patient for disease of the gall-bladder or bile-ducts, discovers certain pathological changes, in some parts perhaps very advanced, in other parts in an early stage. When the patient has recovered, the anamnesis may be carefully re-examined, and ampler details may be sought upon many points which were not before made clear. Again, an operation may be carried out upon the stomach, intestine, uterus, or appendix, and the gall-bladder examined incidentally. Stones therein may be found, stones, which never before had excited any suspicion as to their presence, yet, when the patient is again cross-questioned, the exact details of certain symptoms related thereto may be obtained. It is in this way that we have come by degrees to recognise that the early symptoms, the inaugural symptoms I would prefer to call them, of cholelithiasis are sufficiently definite to allow of a confident diagnosis in a great many cases. These symptoms are referred, by all patients, not to the liver, or gall-bladder, but to the stomach. The comprehensive term "indigestion" is used by all patients to describe their sufferings. "Indigestion" means, to them, a pain, or discomfort, or uneasiness after food. The pain is not acute, but is rather a sense ot fulness, flatulence, oppression, or distension in the epigastrium. This feeling comes usually half an hour to three-quarters of an hour after food. It is excited constantly by certain kinds of food; apples are frequently held culpable, and cheese also. Coffee, or tea, or certain flavourings in puddings, or in "made-dishes," are known to produce an attack of this kind. The sensation of distress is relieved by belching, and especially by vomiting; it may at times increase so much in severity as to be described as an acute pain. The centre of the pain is always in the epigastrium, although it may radiate to one side, or to the other. If it should be felt severely on the right side, a symmetrical pain on the left side is not seldom experienced. In the severer attacks, the pain goes through to the shoulders, particularly to the right shoulder.

In such attacks, there may be a "catch in the breath"; the patient says that it is impossible for a deep breath to be taken, for, as the chest fills, a sudden stabbing pain is felt which cuts short the inspiratory effort. This spasm of the diaphragm is very characteristic of gall-bladder diseases, and often distinguishes them from gastric or duodenal conditions, with which they are apt to be confounded. If close inquiry is made, the patients will often tell of an occasional shiver, which is felt when the pain is severe, and is prone to come in the evening. The shiver, or chilliness, is never severe, never approaches a rigor in severity, it is rather a feeling of cold, a "goose-flesh" sensation, which lasts but a few minutes. At the same time, the patient commonly experiences a sensation of weight and fulness in the head, of drowsiness, or of a dull heavy headache. Attacks of migraine are sometimes noticed, especially when the patient is fatigued. Mental concentration, indeed work of any kind, then becomes burdensome. These are the "inaugural symptoms." If they persist, or recur, in the characteristic form here described, there need be little hesitation in affirming the presence of stones in the gall-bladder. In this description, there is no mention of the cardinal signs or symptoms of cholelithiasis, with which the text-books have made us familiar. We are therefore in a position to understand how it is that the venerable fallacy, which states that gall-stones often exist in the bladder without giving rise to symptoms, has been so confidently asserted, and so readily accepted. I am disposed to say, without hesitation, that gall-stones are never present in the gall-bladder without giving rise to symptoms. It is perfectly true to say that they do not cause those symptoms which we read of in the text-books; but those symptoms are, I submit, nothing but the clinical expression of the later complications of the disease. I have made it a practice, for some time past, to examine the gall-bladder in all operations upon the adjacent abdominal viscera. In many of these, I have unexpectedly found gall-stones, and have removed them. In no single case have I failed to elicit a history from the patient of sufferings, which were indubitably to be connected with their presence. The instant relief from these sufferings has been a further proof that their cause has been removed. We are, I think, fully entitled to say that there is no valid evidence that gall-stones are ever present, without giving rise to symptoms which should tell us clearly of their existence. If, then, the presence of stones in the gall-bladder can be surely recognised in an early stage, what is to be done? I have no doubt that the general answer to this question would be that medical treatment, the administration of Carlsbad salts, of urotropine, the taking of a "cure" at Carlsbad, or Harrogate should be advised. Therein I think a mistake is made. The belief, which I hold to be fallacious, that gall-stones can be rendered "latent" by medical treatment, justifies the various therapeutic measures which I have named, and others of the like kind. When the diet is strictly ordered, Carlsbad salt regularly taken, active exercise forsworn, and all risk of a chill avoided, the symptoms may be kept in check, or, possibly, in complete abeyance. But any indiscretion is apt to excite them once again, and the barriers, so erected around a patient's daily life, prove irksome. The stones are "latent," so far as the severer symptoms are concerned, but that they are still doing harm is not open to doubt. For, after a period of "latency," the patient may exhibit some serious complication which has stealthily arisen, and, with little warning, quietly developed to a lethal degree. Carcinoma of the gall-bladder may develop, as I have many times observed, or, with awful abruptness, a perforation of the gall-bladder, or an attack of phlegmonous cholecystitis may occur. Medical treatment then may do something, may even do much, to keep the complications of the disease in check, but the most that can be done in this way is probably very slight. The pathological changes, which gall-stones set up, are quietly progressing, and are surely laying up a store of harm for the future. When the patients, who have undergone their cures for one or several years, are operated upon, the gross pathological changes, which are found in and around the gall-bladder, are incontrovertible proof that the "latency" of the stones did not extend to their pathological manifestations. During that time that symptoms are kept almost entirely in subjection, insidious morbid changes are progressing, changes which may involve the gall-bladder, the liver, or the pancreas; and of these the last is certainly not the least serious. If these statements are accepted, and the evidence in their favour is strong, it is surely a more prudent course to advise an operation in the early stage, than to wait until serious havoc has been wrought by the wide extension of the disease. If operation is practised in the early stage, it is a simpler and a safer procedure, is attended by remarkable success, and is followed by no distressing after-effects. On the other hand, the late interventions are more serious, technically more difficult, attended by a higher mortality, and, in some cases, are followed by those remote complications of gall-stone disease which are beyond the hope of cure.

Much of the discussion, which has waged around the relative merits of cholecystotomy and cholecystectomy, would have been rendered needless, if the same types of cases had been dealt with by the opposing protagonists. The difference between surgeons is not so much one of ideals, as of material.

When a case of cholelithiasis is operated upon in the early stage, the wall of the gall-bladder is found to be but little altered from the normal. The natural deep blue colour has changed hardly at all, or a white opacity is seen only here and there. The capacity of the bladder as a reservoir, and its power of contractility, are unimpared. None of the coats have undergone any great change, and the muscular power is undiminished. The removal of the offending stones leaves the gall-bladder then in almost a normal condition, and drainage, for a few days, helps to restore the little damage which a slight infection may have caused. There is accordingly no indication for the removal of such a gall-bladder; its sacrifice would violate that fundamental principle of surgery which asserts that an organ, whose function can be properly performed without any menace to a patient's life or health, should not be removed. It is better to restore function to any organ than to remove it. On the other hand, in the cases which come late to operation, the circumstances are entirely different. The gall-bladder, having suffered repeatedly from attacks of inflammation, has lost all the suppleness and elasticity which its walls naturally possessed. The various coats are not to be distinguished one from another, all are replaced by a thick white fibrous desposit, which, in the manner natural to cicatricial tissue, contracts by degrees until the cavity within has become greatly diminished in size, or even obliterated altogether. Such a gall-bladder acts possibly as a cistern, but necessarily as a very imperfect one, and all power of timely emptying, by a muscular contraction of its walls, has long since disappeared. The function, therefore, is of little or no value in any case, and, in not a few, the change from a chronic inflammatory deposit into carcinoma may already be taking place. The examination of the thickened walls of a gall-bladder, which has been many times inflamed, reveals, in a notable proportion of instances, the presence of carcinoma. In circumstances such as these, the removal of the gall-bladder is always desirable, and is frequently imperative. The risks of cholecystectomy are slightly greater than those of cholecystotomy; but the cases dealt with by the former operation are, on the whole, of a more serious type than those for which the latter suffices. The pathological changes are more advanced, and the involvement of the neighbouring parts is likely to be more extensive. The fact that one surgeon advocates cholecystotomy, while another treats almost every case by the removal of the gall-bladder, is due not improbably to the fact, that the one recognises the presence of stones more certainly at an earlier period, whereas the other is less confident of his diagnosis, and requires the presence of complications to convince him of the need for surgical interference. The intimate study, and the widespread recognition of the inaugural symptoms of cholelithiasis are most necessary, to enable us to discern the presence of stones, at a time when their removal may be undertaken without risk, and when a complete restoration of function in the parts may be confidently predicted.

When the diagnosis of cholelithiasis has been made, the question at once arises as to the most satisfactory method of treatment to be adopted. I look forward with every confidence to the time when no other treatment than that by operation will be first considered. If stones are present in the gall-bladder, symptoms due to them are always caused, and the severity of those symptoms can be kept in check or even completely relieved for a time, but the stones remain. The symptoms are apt to appear abruptly at any moment, and insidious and irrecoverable damage may meanwhile be progressing in the gall-bladder or the liver. No one has ever suggested, so far as I am aware, that any medical treatment removes the stones; the most that is claimed is that the stones are caused to remain "latent." Stones in the gall-bladder are treated to-day, by some, as stones in the urinary bladder were in the days of Montaigne. I hold the opinion that, as soon as gall-stones are known to be present in the gall-bladder, the safest, the speediest, the only proper treatment is to remove them. Operation should only be negatived on account of the presence of some condition in other viscera, the heart, or the kidneys, which would render this course hazardous. Argument by analogy is rarely convincing, but I cannot resist saying, by way of illustration, that the neglect to operate in cases of biliary calculus, will soon be as rare and strange a thing as the neglect to remove an offending renal or vesical stone would be to-day. Gall-stones cause symptoms every whit as serious as those set up by a renal stone, the complications, to which they give rise, are a far graver menace to a patient's life and health, and their removal is a safer procedure. The timely removal of gall-stones is attended by a death rate of less than one per cent. Delay in having recourse to operation causes the risks to become grave, and the prospect of complete relief to be much diminished.

In the recent discussion at the meeting of the International Society of Surgery in Brussels, Professor Kehr presented a very elaborate report, in which his statistics, down to June 1908, were tabulated and examined. Professor Kehr holds the opinion that the majority of patients, who suffer from gall-stones, should be treated, not by operation, but by one or more visits to Carlsbad, and by the usual "medical" methods. Operation is advised only in the cases where hydrops, or empyema, has developed, or in recurring attacks of cholecystitis, or in cases of chronic occlusion of the common duct. He does not approve of, and has not often practised, the "early" operation for cholelithiasis, and he accordingly prefers cholecystectomy to cholecystotomy. The results are interesting:—1,309 operations have been performed upon 1,211 patients with 225 deaths, a mortality of 18·5 per cent. Of the patients who survived, 84 per cent. are cured; the remaining 16 per cent. had stones left behind, or suffered, subsequently, from colic or hernia. That is to say, that, of every 100 patients treated by operation, only about 68 are cured, roughly, 2 out of 3. Such is the record of the ablest and most experienced among the more conservative surgeons. It raises the question, "Are we to cultivate the power of recognising the presence of gall-stones, at the earliest possible moment, so that they may be safely removed, and the patient quickly restored to complete health, or are we to rest content only with the clinical recognition of the late complications, which the stones excite, only when these have developed, to advise operation, necessarily then of a more serious nature, and are we then to be satisfied with the prospect of giving complete relief to two patients only out of every three that submit to surgical treatment?" There can surely be no doubt as to the answer.

INDUSTRIAL DISEASES.

BY ALEXANDER SCOTT, M.D.,

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AN accurate knowledge of industrial diseases, like diseases of the skin, can best be acquired by actual experience. So much depends upon the nature of the employment, its conditions and surroundings, so much upon the vigour and health of the workers, their habits and mode of life, that, without this knowledge, diagnosis is difficult, and treatment unsatisfactory. Of the truth of this statement the writer's own experience affords ample proof.

In 1887, a young woman suffered from periodic attacks of violent pain in the gastric region, thought to be due to chronic dyspepsia. The usual sedatives gave little or no relief, nor was the correct diagnosis arrived at until one evening she vomited her food, which was found to be mixed with yellow chromate of lead. She was employed in the heading, or carding department of a dye work, in which the atmosphere was hot and loaded with the dusty poison, with which the yarn was dyed. Case upon case followed, and as the girls were free to resume work after recovery, the disease increased in intensity. One patient became totally blind, several suffered from convulsions, and one died from coma after about six hours' illness. Aerial poisoning by lead was then unknown, and the employers would not admit that the illness was due to the nature of the work, especially as the girls never *handled* the poison. At my suggestion, an efficient fan was erected, and the epidemic immediately ceased. In the following winter sporadic cases cropped up, and, on investigation, I learned that these were due to the occasional stopping of the fan, owing to the workers complaining of cold caused by it when in operation.[1]

But diseases of occupation vary greatly in their causation, and it may be convenient to group them according as they are induced by (1) dust, (2) gas fumes or vapour, and (3) micro-organisms.

Dust is the most prolific source of disease in our factories and workshops, and the danger is proportionate to its composition; for statistics prove that, among those engaged in certain dusty occupations, the death rate is fully four times larger than that among agriculturists. Even dust, which is *per se* innocuous, becomes harmful when the quantity inhaled is so great that it cannot be expelled by the ciliary filaments of the air passages, as it thus reaches the lung tissue, and causes induration and pigmentation, as in anthracosis due to coal dust. As has been shown, lead poisoning is caused by a chemical dust which is dissolved and absorbed; the dust, which is given off by an emery wheel being chiefly composed of silicious and metallic particles, wounds and irritates the lung tissue; while the dust of potassium bichromate, acting as a caustic, produces the "chrome hole" of those engaged in its manufacture.

Lead poisoning is the most prevalent of all industrial diseases. During the year 1907, there were notified to the Home Office no fewer than 578 cases, of which 26 were fatal. These notifications chiefly included dippers and others, who, engaged in potteries, are constantly exposed to lead, either in solution or in the form of dust; white lead workers; coach and motor-car painters, who inhaled the dust in the process of sandpapering; enamellers, who sprinkle the dry powder over red hot hollow-ware to form a glaze; printers, from handling the type; and a large number of workers engaged in smelting, type-founding, and stereotyping, from inhaling the fumes of the molten metal. Nor does this number include the countless cases, which, occurring in other industries, are never heard of, and may never have been recognised, until advanced degeneration has rendered the case hopeless.

Symptoms and Treatment.—A frequent sign that a person is exposed to lead poisoning, is the presence of a blue line along the margin of the gums where they are joined to the teeth, and this is generally more marked on the lower than on the upper gum. It is only unmistakable when the teeth are present, as the line is composed of sulphide of lead from the combination of the dust with the sulphuretted hydrogen generated by the decaying food between the teeth. It is generally more marked when due to inhaling the fumes, but, though it may be present in every instance, it affords no positive proof of poisoning. It is simply a confirmatory sign. Bloodlessness is also a constant symptom of the disease, and the pallor always seems to me to be more intense than in other forms of anæmia or wasting diseases. Lead has a very marked effect upon the red corpuscles of the blood, and no doubt this accounts for the well-known susceptibility of anæmic females, and also for the occurrence of miscarriages. Recently, it has been ascertained that the red corpuscles of those affected by lead poisoning are basophilic, and this is now considered a most trustworthy sign.*

Lead has a still more deleterious effect on the nervous system, the earliest signs being colic, constipation (sometimes diarrhœa), and vomiting. The pain, various in intensity, is paroxysmal in character, most severe at the umbilicus, and not accompanied by a rise in temperature. These symptoms, along with a slow pulse and presence of the blue line along the gums, differentiate the disease from peritonitis, or appendicitis.

Still more directly connected with the nervous system is the affection known as wrist-drop, which is due to paralysis of the muscles of the hands and forearms, especially the extensor muscles thereof, and paralysis sometimes affects the lower extremities also. But of all nervous affections, due to lead poisoning, none is so distressing as encephalopathy. It may be ushered in by severe headache followed by convulsions, coma, and death; and yet there may have been no warnings, such as colic, or wrist-drop. Especially in the earlier stages of the disease, albumen may be present in the urine, and is almost constantly found after the administration of iodide of potassium. For the detection of lead in the urine, I have always relied upon chemical analysis, but Dr. Oliver recommends the simpler method of suspending in the urine a small bag containing sulphide of calcium, when, if the latter becomes black, lead is present owing to the formation of the black sulphide of lead.[3]

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* It is well to remember, however, that this condition is generally found in cases of advanced anæmia from other causes.

Treatment.—If this colicky pain is very severe, it may be necessary to give a hypodermic injection of morphia, and, as the poison is eliminated through the bowels and kidneys, a mixture of sulphate of magnesium and iodide of potassium gives excellent results. For paralysis, improvement is generally obtained from electricity and massage. Prophylactic treatment is, however, the more important. Cleanliness, avoiding the taking of food with unwashed hands, in working clothes, or in the workshop; free ventilation; exhaust fans to prevent dust rising, and the wearing of respirators where dust is unavoidable, are matters of life or death. The use of tobacco in the factory, more especially the filthy habit of chewing that weed and spitting, should be absolutely forbidden. Anyone addicted to intemperance in the use of alcohol is especially liable to the disease, not only from its cirrhotic effect upon the internal organs, but also from the panting and shallow breathing which results from excess.

Coming now to dust, which is insoluble, the danger depends upon the quantity and the composition. Even if it is innocuous, it may block the air-passages, and cause bronchitis and asthma, whereas if it is gritty, there may be not only infiltration, but irritation or wounding of the lung tissue as well. Stone hewers, for this reason, suffer from pulmonary affections, and, were it not that they work chiefly in the open air, the danger would be greater. Grinders, cutlers, and polishers are even more exposed, for with contracted chest they bend over the grindstone or emery wheel, when, if the dust is dry, it is virtually pumped into their respiratory passages. The irritation becomes so extensive and the resisting power so much lessened, that the lung becomes a fertile soil for the bacillus of tubercle, and the worker is in danger of infection in the factory, in his home, or in the public house. Dr. Scurfield, the Medical Officer of Health for Sheffield, writing on the subject, says; —"The dusty trades of Sheffield produce their chief effect by increasing the fatality of consumption and diseases or the breathing apparatus. Thus, of the population over 25 years of age, while in England three males to two females die from consumption, in Sheffield six males to two females die. This means that about 120 males over the age of 25 die every year in Sheffield from consumption, who should not die if the conditions of work were as good in Sheffield as in the rest of the country."[3]

On examination, post-mortem, the lungs are increased in weight, sometimes doughy, and when cut open, small gritty particles can be felt embedded in the intra-vascular tissue, which grit is of the same nature and appearance as that found in the atmosphere. The walls of the bronchi are thickened, and stand out like small metal pipes.

The treatment is chiefly preventive. The sputum must be examined for tubercle bacillus, and, should there be any sign of irritation of the lung, the patient must be advised to change his occupation.

GASES AND FUMES.

As with lead, poisoning by mercury may be caused by the fumes of the molten metal, but it is comparatively rare. It occurs in the making of barometers, thermometers and hydrometers, and is usually the result of carelessness. During the year 1907 there were reported to the Home Office 109 cases of poisoning by different gases, and of these 81 were caused by carbon-monoxide, 10 being fatal. To carbon-monoxide poisoning are exposed blast-furnace men, coal miners, and mechanics, when engaged in repairing exhausters or examining disused cylinders. The furnace men may be affected when tapping the cupola, when cleaning the flues, or by an escape of gas at some defective joint. It is known as "clear gas," has a pleasant odour, and the first symptoms of poisoning are headache, giddiness, and ringing in the ears. The attack may be sudden, causing him to fall and seriously injure himself, or it may be insidious and a pleasant dreamy sleep induced. In two severe cases the patients suffered from convulsions and entire loss of consciousness, which in the one case were followed six months thereafter by dementia and death, and in the other by partial recovery, for, on three years after the accident, he was still facile, and could not be trusted with any responsible work.[4]

Pathology.—The morbid condition, which gives rise to these symptoms, is caused by the action of carbon-monoxide on the blood, and by its toxic effect on the nervous system. Its combination with carbonic oxide proves fatal to human life more or less speedily. In death from carbon-monoxide, the expression is pleasant, and the face is generally of a rosy hue as if alive, and, if the blood is examined, it presents a dark purplish-red colour like that of ripe cherries.

This is explained by the fact that carbon-monoxide has a marked affinity for the colouring matter of the blood, and forms carboxy-hæmoglobin, the chief characteristic of which is stability, as it cannot be broken up by any known solvent. This remarkable stability provides us with a ready method of differentiating between it and the ordinary oxy-hæmoglobin. In the spectroscope, they both present two absorption bands which are very similar, and, if to a solution of oxy-hæmoglobin there are added two drops of yellow sulphide of ammonium, the bands disappear; whereas, in the case of carboxy-hæmoglobin, they resist reduction.

Treatment.—During the early stage, a free current of fresh air, the inhalation of oxygen, together with stimulation by carbonate of ammonium, the injection of ether, or $\frac{1}{100}$th grain of nitro-glycerine, are naturally indicated. The stability of the new compound baffles all treatment other than alleviative. It is a well-known fact that reducing agents are constantly present in the blood, and that they even accumulate during asphyxia, and, in this way, give a scientific colouring to a barbarous form of treatment. Old miners have informed me that, in the days when poisoning was more common, "first aid" was rendered by immediately bringing the patient to the surface, burying him in a newly-made grave with his face downwards, and, after a short interval, exhuming him, when respiration slowly commenced. Explain it how we may, the germ of truth is there. Sparrows, after a whiff of gas, drop down apparently dead, and sometimes boys rush to the spot and bury them in the sand beds, and, after a while, carry them home as living trophies.

It may be added here that such gases as nitro di-nitro benzene, and nickel carbonyl, also cause poisoning by changes in the red corpuscles, and certain symptoms are common to all in the group.

MICRO-ORGANISMS.

In this group may be included ankylostomiasis, or miners' worm, a disease which has been added to the third schedule of the Workmen's Compensation Act, and which is almost unknown in Scotland. It is caused by a small thread-worm, Ankylostomum Duodenale, which attaches itself to the mucous membrane of the duodenum and jejunum, sucks the blood, and gives rise to innumerable hæmorrhages. Countless ova are passed in the fæces when the larvæ, fostered by damp and dirt, once more gain admission into the body by contaminated water, or eating with unwashed hands.

Anæmia, shortness of breath, weakness, and swelling of the feet and ankles are chief symptoms, so that the detection of the ova is the only proof of the presence of the disease. In the early stages, vermifuges and ferruginous tonics effect a cure, but only then.

GLANDERS.

Glanders is a contagious disease, due to the presence in the blood of the bacillus Mallei, and is communicated to man by the horse, ass, or mule, animals which are specially liable to the disease. Man is peculiarly refractive, for in Glasgow there have been several stable epidemics, and yet, since 1892, there have only been five cases. It may be inoculated through a scratch, or cut, but, most frequently, it is caused through the horse sneezing, or coughing, and thereby spraying the mucous membrane of the eye, nose, or mouth of the attendant. The period of incubation ranges from two to fourteen days, during which the high temperature, headache, malaise, red spots, and slight pneumonia seem to point to an attack of enteric fever, and generally, not until the offensive discharges from the nasal and respiratory mucous membranes, or until the "farcy buds" appear, is a definite diagnosis arrived at. Injection of mallein demonstrates the presence of the disease by a rise of temperature. The disease is generally fatal, and treatment is chiefly preventive.

ANTHRAX.

Of all contagious diseases, due to the presence of micro-organisms, none is more difficult to contend with than anthrax. It is communicated to man by horses, cattle, and sheep, and is due to the entrance of the bacillus anthracis, which presents the appearance of rods of varying length, either straight or bent in course of division, and, inside these rods, may be seen the spores lying like peas in a pod. One remarkable characteristic of this germ is that the bacillus is readily destroyed by heat at 140° F., or even lower, whereas the spores are so tenacious of life that their annihilation requires a temperature of 220° F., which in some cases destroys the fabric as well. It may gain admission through a trifling scratch of the skin, by eating the flesh of diseased animals, by taking food with unwashed hands, or it may be inhaled in the form of dust; and the course of the disease depends largely upon its mode of entrance. At the seat of inoculation, a small pimple usually appears, surrounded by an inflamed, reddened base. In a short time the pimple becomes vesicular, and breaks down, leaving a blackened eschar, round which a number of vesicles crop up giving the typical appearance of malignant pustule. Very soon the lymphatic vessels and glands become involved, delirium and coma ensue, and death takes place in from three to five days. In the gastric form, there are vomiting and diarrhœa, and, in the pulmonary form, acute bronchitis with rapid breathing and cyanosis. For the year 1907, the number of cases reported was 58, of which 11 were fatal. Of the persons affected, 23 were wool-sorters, 17 were employed in horse-hair factories, 12 in the manipulation of hides and skins, and 6 were from other sources. My own experience has been derived from cases of infection by horse-hair, and the following notes of a particular case are interesting and instructive.

A firm in Glasgow had delivered to them a consignment of Russian hair, which was tied in bales and uncovered. These were carried into the factory on the shoulder of the carter, on the back of whose neck was an insignificant scratch, and on this spot, within forty-eight hours, a characteristic pimple developed. In due course the symptoms, local and constitutional, became so alarming that he had to be removed to the hospital, where the pustule was excised, and the man's life saved. The next to handle the infected hair was an unfortunate woman, whose habits and mode of life had rendered her peculiarly susceptible. She, when opening out the bales, inhaled the dust, and thus contracted the pulmonary form of the disease, which caused her death. After being assorted, the infected hair was mixed with other hair, and then despatched to a cabinet-maker's workshop to be used in stuffing mattresses. While being conveyed to this place, some of the hair fell on the floor of the show-room through which it had to be carried. On this account, the floor had to be frequently swept by an attendant, a young woman, and she was immediately infected by the disease. A small pimple developed on her face below the malar bone. In her case, the most pronounced symptoms were sickness, vomiting, and ever-increasing pain in the gastric region, until death took place on the tenth day. In the autopsy, malignant pustules of large size were found in the stomach, and smaller ones in the intestines. It is an interesting fact that this poor girl had been in the habit of nipping with her incisors small bits of hair, which were frequently observed adhering to the lips and angles of her mouth.

I would once more revert to the tenacity of life possessed by the spores as shown by the following fact. The factory people declared that this hair had been rendered incapable of carrying infection inasmuch as it had been (1) boiled in dye for two hours, (2) boiled in copperas for one hour, and (3) stoved at a temperature of 150° F. to 168° F. for 48 hours. That hair has now been used in stuffing mattresses, and, unless the disease germs are finally annihilated—say, by some beneficent fire—they may go forth once more to slaughter the innocent.

In regard to curative treatment, the best results have been obtained from immediate excision, and the injection of Sclavo's serum, which certainly is one of the most trustworthy agents in serum-therapy.

In conclusion, I would refer to the Milroy lectures, of 1901, in which Dr. T. Morison Legge, H.M. Medical Inspector of Factories, so ably and exhaustively discusses the whole history of the disease, particularly with reference to the means of prevention.

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AN ACCOUNT OF THE THEORY AND EMPLOYMENT OF BIER'S METHOD OF TREATMENT BY PASSIVE CONGESTION IN CASES OF RHEUMATOID ARTHRITIS, TUBERCLE SEPSIS, AND VARIOUS OTHER CONDITIONS.

BY A. W. WAKEFIELD, M.A., M.B., B.C.

(*Concluded.*)

(*c*) SEPSIS.

By the general consent of those who have made trial of congestion, acute sepsis is one of the conditions most easily benefited by this treatment. With regard to chronic sepsis there is considerable divergence of opinion.

In the limbs, acute sepsis of any description, including osteomyelitis, may be treated in this way by means of the bandage. Boils, carbuncles, etc., on almost any part of the body may be treated by the small glass balls, exhausted by the rubber ball method. Pus must, of course, be evacuated.

The prophylactic employment of congestion for lacerated or other wounds, which have possibly been infected with pyogenic organisms, is especially emphasised by Bier. I have had little practical experience in this way, but from the case of my own thumb, to which I shall refer later, and, judging from the excellent results which I saw achieved at Bonn in such cases, I fully believe in the value of congestion as a prophylactic agent. The bandage should of course be applied as soon as possible, unless contra-indicated by hæmorrhage.

The rules for the employment of congestion in these cases of sepsis or expected sepsis, are as follows:—

Congestion, as in all other cases, must never cause but rather alleviate pain.

The part should be continuously congested for 18, 20, or 22 hours daily.[1] This, in cases of inflammation, causes a very profound reaction. The part becomes very swollen and œdematous, and of a reddish purple colour.

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[1] Frommer (*Weiner klin. Wochenschr.*, 1906, p. 200, No. 8) recommends short periods of congestion, as for tubercle. Bier (*Hyperæmie als Heilmittel*, 1906, p. 291) has found this method unsatisfactory.

During the intervals between the daily periods of congestion the part should be kept elevated to aid the absorption of œdema. This occurs rapidly, and at the same time the part assumes a more natural colour. There is generally a little œdema left, even after the part has been elevated for some hours. This is no contra-indication to the renewal of congestion, so long as the greater part of the œdema has disappeared. If there is a discharging wound, the suction apparatus may be used in the ordinary way for three-quarters of an hour daily, and the congestion then continued for the desired period by means of the congestion bandage. There is no necessity to employ the suction apparatus in these cases, congestion produced by the bandage alone gives surprisingly satisfactory results. But both Bier and Klapp consider that the best results are obtained when the method is combined with treatment in the suction apparatus. Dr. Laurie and Dr. MacLennan[1] also recommend this combination, and judging from the small experience I have had, I am inclined to agree with them.

According to Bier fomentations are not to be used, but the wound is to be very loosely bandaged in a dry sterilised gauze dressing. Packing, or a tightly fitting gauze drain, must on no account be employed, and it is most essential to secure free drainage, for there is generally a good deal of exudation from the wound during congestion.

I have found fomentations in some cases to give greater satisfaction than dry dressing.

If there is pyrexia, the temperature usually begins to fall about an hour after congestion has been produced, and at the same time other symptoms caused by the toxæmia become correspondingly diminished in severity. If the bandage is properly applied local pain is generally alleviated in a few minutes.

If there is an abscess or collection of pus, it is, of course, to be incised and evacuated in the ordinary way.

Now in many cases, such as those of boils, carbuncles, etc., I am unable to find any great advantage in this form of treatment. It appears to me that the usual treatment by incision, evacuation, and fomentation, is usually quite satisfactory, and much more simple than suction for three-quarters of an hour daily. But for sepsis in the limbs, and for prophylaxis, I consider congestion, as effected by the congestion bandage, most valuable. It is absolutely simple, and is often, I think, more effectual than treatment by fomentations, etc.

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[1] THE PRACTITIONER, October, 1907, p. 507.

This treatment for acute sepsis has been highly recommended by Bier, by Professor Chiene of Edinburgh,[1] by Dr. Laurie, and by Mr. C. W. Cathcart. The last-named has written a most interesting article in *The Scottish Medical and Surgical Journal* (1906, p. 302) entitled, "On Bier's Treatment of Acute Inflammation by Passive Congestion." In this article he strongly advocates this treatment from his own experience of it. He says, "this at least is certain, that, based upon his theory of inflammation, Bier has devised a practical method of treating suppurative diseases which is astonishingly successful and no less simple than effective." He refers later to this treatment as "a method which is comparatively unknown, but which I am certain will before long be recognised as one of the standard methods of treatment in the hands of the profession." He goes on to quote excellent results obtained by Bier, and then gives his own experience of the method "which has been on the whole not only satisfactory, but surprisingly so."

He then gives various details of cases which he has successfully treated by congestion. These include cases of inflammation, gonorrhœal arthritis, and pain from gummata of the tibia in a case of congenital syphilis, where potassium iodide had been tried without result. He has experienced no bad results from treatment by congestion.

Finally, after discussing various other forms of treatment for inflammation, he says, "as contrasted with these other methods, passive congestion is immensely superior. It cures the earlier stages of acute inflammation without allowing suppuration to develop, it checks and limits acute inflammation and suppuration when already advanced, and it soothes the pain like an anæsthetic. In fact it acts better than the best of them for any stage of the affection, and it is simpler than the simplest."

There are also interesting articles on this subject in the

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[1] Professor Chiene tells me that he finds congestion of more use in septic than in tuberculous cases.

Medical Review for the year 1900, p. 171, and for 1905, p. 535, and there is a brief review of Bier's *Hyperœmie als Heilmittel* in the *British Medical Journal* of February 23, 1907, p. 442.

Accounts are also given of the successful employment of this treatment by Drs. Alex. MacLennan and Dan McKenzie, in THE PRACTITIONER, October 1907, p. 507 and p. 517.

Mr. Edred M. Corner, in his *Operations of General Practice* (p. 220 *et seq.*), strongly recommends congestion in cases of both acute and chronic sepsis.

Captain C. M. Goodbody, I.M.S., who has treated nine cases of chronic osteitis and periostitis with discharging sinuses by means of congestion, considers that, after the preliminary scraping, this method gives better results than any of the usual forms of after treatment. He usually applies the bandage for from two to four hours daily.

The artificial increase of inflammation is so absolutely at variance with the commonly accepted principles of treatment in acute sepsis, that I first tried congestion in such cases with very considerable hesitation. My first experience did not encourage me, but it was really not a fair test. I had ordered continuous congestion for arthritis of the ankle, and neglected to attend to a small blister on the heel, caused by an ill-fitting boot. The blister, after bursting, became septic, in spite of congestion, but it was subjected to the constant irritation of the boot, and was unprotected from dirt.

Shortly after this, an experiment on my own person was so successful that I considered myself justified in making further trial of this treatment. In the course of a small operation of a septic nature I wounded my thumb. Three or four hours later I experienced a slight sensation of tingling and irritation. This increased, until six and a half hours after the accident there was distinct inconvenience. I thereupon produced congestion by a bandage above the wrist, and after a few minutes the tingling disappeared. When the bandage had been on for about three-quarters of an hour it began to work loose, so I took it off and thought no more about the matter until a return of the previous symptoms drew my attention to the fact that the part was now inflamed and tender on pressure. Being on duty at the time, I was unable to do anything further for about an hour, during which time the inflammation increased. I then applied a complete ring of collodion and wool around the base of the thumb, and this, after a short time, afforded complete relief from all irritation. There was still some tenderness on pressure. Next morning the tingling returned, and I found that the collodion had worked loose. So I removed it, and then waited for an hour or two in order to ascertain if the tingling would become worse. This occurred, and as the part was still red, and tender on pressure, I renewed the collodion ring, making it rather thicker. The therapeutic effect was exactly the same as on the previous occasion, but the ring, being thicker, did not work loose.

That evening the redness and tenderness on pressure began to subside, next morning it had practically disappeared, and I removed the ring at midday, and experienced no further inconvenience.

Now I am unable to prove that I should have had a bad septic thumb but for congestion, although I believe that this would have been the case, but the experiment was absolute proof of the pain-relieving quality of congestion.

This satisfactory result emboldened me to make a further trial of congestion for acute sepsis, and further experience has increased my confidence in this method. But to those who have not previously tried this treatment, there is due a word of warning against a trap into which I have fallen. In one case the relief from pain was so extraordinary that for some time I failed to realise the fact that drainage was unsatisfactory ; this would probably have been obvious enough but for the analgesic properties of the bandage. It is most essential in these cases to have very free drainage owing to the increase of exudation caused by congestion.

In order to demonstrate the value of congestion for acute sepsis, I will quote the case of J. P. C., aged 30 (No. 458/1907, Branch Seamen's Hospital). The man had had the distal phalanges of three fingers on his right hand removed by an accident. The flexor tendon sheaths had become infected, and the hand was in a state of acute inflammation. The patient told me that he had not enjoyed a good night's rest for 13 days owing to pain and restlessness. The hand was congested by a rubber bandage applied round the forearm, well above the wrist.

The first time the bandage was too tight and was therefore removed. Later in the evening it was again applied, this time rather too loosely. In spite of this error, the pain soon afterwards disappeared, and the patient slept soundly all night. The temperature was, however, not much lowered. Next morning there was no pain until an hour or so after the removal of the bandage. The pain then began to return and the patient asked to have the bandage re-applied, "For," he said, "it was a very great comfort." Instead of this, the hand was placed for some hours in a bath containing a weak solution of lysol, and the pain again disappeared, only to reappear soon after the bath had been discontinued. That evening the pain was very acute, and the patient was very restless, having a temperature of 102·4° F. The bandage was re-applied and in a few minutes the man was fast asleep, and next morning he told me that he had enjoyed "a very good night" and that the bandage was "a wonderful relief." The temperature had dropped to 98·8° F.

The lysol bath was repeated, but shortly after the hand had been removed from this the pain again came on, and soon after mid-day the temperature had risen to 100° F. Congestion was again employed, and at 8 p.m. the temperature was 99·8° F., and there was no pain. Congestion continued to afford absolute relief from all pain, and to cause marked improvement in the general condition. This was very noticeable a day or two later, when at 10 p.m. the patient complained of pain and was very restless. The temperature was 103° F., the pulse rate 112, and the respiration rate 36. The bandage was found to be too loose; this was tightened, and the patient said that his hand at once became easier. He fell asleep almost immediately, and an hour later the temperature had dropped to 101·8° F. The whole appearance of the patient had changed, and he had no pain.

The case was naturally a long one, but the man now has fair mobility in his wrist and remaining digits. In addition to the relief from pain, and the improvement in the general condition, I feel convinced that congestion had no mean share in effecting the local improvement. Long periods of congestion were employed, the bandage being removed for four or five hours each morning. During this interval the hand was placed in a lysol bath, and, if swollen, was then elevated for a short time before the bandage was replaced. Fomentations were used instead of the dry dressing recommended by Bier.

Although the temperature generally rose each evening, it was obviously moderated by the congestion. Openings were, of course, made to allow the pus to escape. After acute inflammation had subsided the sinuses persisted unchanged for many weeks, and congestion, as produced by the bandage, seemed unable to promote their closure. The suction apparatus was then employed for three-quarters of an hour daily, at a negative pressure of about 3 inches of mercury, and in less than three weeks the wounds were completely cured.

(*d*) MASTITIS.

I am dealing with this condition separately for two reasons. In the first place, it is often not septic in nature, but due to other causes of irritation. In the second place, inflammation of the breast is peculiarly favourable to treatment by congestion, judged both by the results, and also from the fact that the dosage of congestion can be more accurately measured than in any other condition. This is because the congestion is effected purely by means of the negative pressure in the suction apparatus, uncomplicated by the pressure of any bandage.

I generally employ a negative pressure of about 1½ inches of mercury running sometimes up to 2 inches or more. Treatment is ordered for three-quarters of an hour daily at first, and, as the case improves, the number of attendances is gradually diminished.

This treatment is recommended for almost any form of mastitis or mammary abscess. The mastitis which follows weaning usually clears up rapidly in a few days treated by congestion only. In cases of abscess, the pus should, of course, be evacuated, and drainage provided for in the usual way, except that smaller incisions are required. Congestion is then to be employed just as in cases with no open wound, but during congestion the abscess cavity must on no account be packed with gauze, and especial care must be taken to ensure very free drainage. In those cases in which the breast is very swollen and tender, and it is not easy to say whether pus is present or not, congestion is of the greatest value. After treatment for a few days, even though pus may be present, the swelling and tenderness usually subside, and the diagnosis becomes much easier.

When treating a mammary abscess, especial care should be taken that the skin does not close too soon over the sinus. This is more than usually liable to occur owing to the rapid healing induced by congestion.

The following case (M. H., 1001/07, aged 30) is of exceptional interest. The patient came up to the London Hospital with a discharging left mammary abscess. She had been confined 11 weeks previously, and the breast had become sore on the third day of suckling. An abscess had formed and been opened, and had been treated by fomentations ever since. The patient said that, owing to the pain, she had not had a good night's rest for 10 weeks. The pain had been slightly better for 2 weeks. The temperature was 99° F.

The woman was told to wean her baby, and was given a mixture containing belladonna and mag. sulph. The breast was fomented and bandaged firmly, and congestion was ordered for three-quarters of an hour daily.

I saw patient again six days later. The breast was very much better, the sinus had closed, the temperature was 98° F., and patient was sleeping better. She, however, continued to complain of some throbbing pain, and I wondered if the pus was re-collecting. Congestion was therefore continued, and this eased the pain. Weeks went by, but still the pain was present, and this became much worse when congestion was stopped. There was no sign of inflammation or other evidence of accumulation of pus. The only way in which pain could be relieved was by the patient continuing treatment by congestion. Finally it was found that the pain was due to a nerve being caught in the cicatricial fibrous tissue. It is an interesting fact that congestion should have afforded relief from the pain due to this condition.

(*e*) GOUT.

In this section I propose to deal chiefly with acute gout. In chronic gout of the joints, I have found congestion to have very much the same effect as in rheumatoid arthritis. The pain is somewhat relieved and the condition slightly improved, but a cure is scarcely to be anticipated.

In acute gout, congestion is of the utmost value, relieving the pain often in a few minutes. Lengthy periods of congestion, up to about 22 hours out of the 24, may be employed, and the bandage should be used for this purpose. The old-fashioned remedy of a collodion ring for gout in a digit, undoubtedly acts by congestion. The mobility is distinctly increased after a few hours, probably owing to the decreased pain, and there is much less tenderness. When the œdema caused by the bandage has subsided, the swelling is found to be greatly diminished. The relief from pain is the same whether the case is primary or an acute attack supervening on chronic gout.

I have not had many of these cases to treat, but in every case that I have yet treated with congestion the relief from pain has been very striking. I think that it is well to use such other treatment as may be indicated, *e.g.*, to administer an aperient, to regulate the diet, or to give colchicum, but that the pain of acute gout may be entirely relieved by congestion alone is shown by the case of a man (H. K., 661/07, aged 48), who for two days and nights had suffered severe pain from gout in the right wrist and hand. Treated by congestion only, the pain disappeared in a few minutes, and the patient slept well from that night onwards. For a week congestion was continued for 22 hours daily, and although the pain did not recur except when the bandage was off, there was still some swelling present, and very slight tenderness on pressure over a small area. Colchicum was then given, and the swelling cleared up more rapidly.

Congestion for acute gout is also recommended by Alkan,[1] and others.

(*f*) GONORRHŒAL ARTHRITIS.

The treatment of this condition by congestion has been highly recommended by Bier and by other German writers. I am unaware of any mention of its use for this purpose in our English literature.

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[1] *Therapie der Gegenwart*, January, 1907, quoted in THE PRACTITIONER, August, 1907, p. 302.

Lengthy periods of congestion, up to twenty-two hours daily, should be employed. The congestion should be produced by means of the bandage.

I have been able to employ the congestion treatment in only three cases of gonorrhœal arthritis. In all of these, the ankles were the parts affected, and in all the improvement immediately following congestion was extraordinary. Two of the patients were allowed to walk about as soon, and as much, as they wished to. One of these men (D. E., 1124/07, aged 21) unfortunately developed a septic heel, but before this occurred the arthritis seemed to have entirely disappeared. The other case (T. E., aged 28), when I first saw him, was scarcely able to walk, and hobbled with difficulty into the room. The man told me that for three nights he had scarcely been able to sleep at all owing to the pain in his right ankle.

On examination the condition was found to be one of gonorrhœal arthritis and peri-arthritis. I congested the foot by applying a bandage well above the ankle, and, urethritis being present, I ordered a mixture containing Buchu and potassium citrate. The pain became easier about two hours later, the patient spent a better night, and the following day he was able to walk about with very little pain. The second day he was following his usual work, which was that of a coal porter, without inconvenience. Congestion, however, had to be applied at intervals for some time longer, for on stopping it the pain re-appeared.

In the third case (M. K., 2001/07, aged 25) the patient was at first confined to bed. Both ankles were in a condition of gonorrhœal arthritis and peri-arthritis, but the left was much the worse, and the pain of this had kept the patient awake for four nights, except for three hours' sleep following a hypodermic injection of morphia (gr. ¼). The patient, who also had urethritis, had been taking a mixture of Buchu and potassium citrate. The left ankle was congested, and about two hours later the patient fell asleep and slept soundly for five hours. Next day he said the left ankle was now easier than the right. It certainly looked much better.

Periodical congestion was continued for this ankle, which, in a few days, became practically well. In the meantime, however, the right ankle became very painful and swollen, and this was consequently congested also, and next day the right ankle was much better. After another period of congestion lasting five hours, the patient said that there was no more pain at all in the ankle or foot. After a few more days of treatment by congestion, there was no pain or tenderness in either foot, and mobility returned to the normal.

In all these three instances the condition was acute. According to Bier,[1] the more acute the case of gonorrhœal arthritis the more striking is the beneficial effect of congestion. In chronic cases it is less serviceable.

(*g*)—OTHER CONDITIONS FOR WHICH CONGESTION HAS BEEN RECOMMENDED.

In addition to the foregoing conditions, Bier recommends, and I have seen him using, congestion for chronic ulcers and for fractures—for recent fractures to allay the pain, and for old un-united fractures to promote union. For the latter purpose, congestion has long been used, and is especially recommended by Chiene and others.

I have had no personal experience of congestion for these cases, and can express no opinion as to its value.

There are many other conditions, *e.g.*, erysipelas, neuralgia, headache, earache, otitis media, senile gangrene,[2] frost-bite,[3] insect-bites,[4] and writer's cramp,[5] for which congestion has been tried and recommended, but, as I have had no experience of its value in these cases, I shall not refer to them further.

I cannot conclude without acknowledging the kindness of Dr. L. A. Smith and Messrs. Mansell Moullin, P. Furnivall, H. Rigby, and A. Evans in permitting me to quote many of the cases referred to in this article.

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[1] Bier: *Hyperæmie als Heilmittel*, 1906, p. 418.

[2] A. Frommer: *Wiener klin. Wochenschrift*, 1906, No. 8, p. 200; *Ueber die Biersche Stauung, u.s.w.*

[3] Habs: *Münch. med. Woch.*, 1903, No. 22, p. 939; *Ueber die Biersche Stauung.*

[4] R. Klapp: *Münch. med. Woch.*, 1905, Ap. 18, p. 740, quoted in *The Medical Review*, 1905, p. 536.

[5] The Practitioner, August, 1907, p. 307, quoting an article by Hartenberg in the *Archives de Neurologie.*

A REVIEW OF DENTAL SURGERY.

By J. G. TURNER, F.R.C.S., L.D.S.,

Dental Surgeon and Lecturer on Dental Surgery, Royal Dental Hospital, London.

Australian Journal of Dentistry, June 30, 1908. In the course of a discussion on School Children's Teeth, by the Odontological Society of Victoria, the general opinion appeared to be that between 29 per cent. and 50 per cent. of the teeth were carious. The same journal records the absorption of a right upper central by an erupting supernumerary tooth. The incisor was displaced, possibly on account of loosened attachment. A similar case of extensive absorption of a lower second molar by an erupting third molar is also recorded.

Australian Journal of Dentistry, May 30, 1908. E. R. Magnus thinks that the use of vulcanite dental plates is injurious, because the vulcanite, owing to its non-conductivity, keeps the underlying tissues in a superheated condition. In all probability, however, a more valid objection is that its unpolished surface is very difficult to clean, and is at all times germ-laden.

In the *Australian Journal of Dentistry*, February 29, 1908, D. M. Paton suggests the use of anti-diphtheritic serum for many dental conditions, *e.g.*, injury, pain after extraction, septic conditions, pericementitis (by injection), and explains its action in Ehrlich's terms, "the serum supplies the immune body, and the tissue fluids the complement."

In the issue of the same journal of January 31, 1908, a case of death from swallowing a partial upper set of teeth during the night is recorded. Neither X-rays, nor passage of a bougie enabled the operator to locate it. The patient did pretty well for a week, then got worse, and died after a futile operation. Post-mortem, the teeth were found lodged opposite the fourth and fifth dorsal vertebræ, and had perforated the œsophagus and trachea.

A case of hysterical closure of the jaws, relieved by chloroform, is narrated in the *British Journal of Dental Science* for August 15, 1908, and there is also an account of an inquest, held on a woman, who had died of septic pneumonia, sequent on a portion of a tooth getting into her lung, at the time of extraction under gas.

E. C. Kirk ("The Constitutional Element in Certain Dental Disorders," *Dental Cosmos*, August 1908) lays great stress on the constitutional factor in pyorrhœa alveolaris. He desires to emphasise that, in the first instance, the invasion of the alveolar structures was made possible by a lowering of the standard of vital resistance of the individual, by reason of some pre-existing nutritional fault, otherwise infection of the alveolar structures would not have occurred; that is to say, malnutrition stands to the alveolar infection in the relation of a predisposing cause. This, we think, may be true in a few cases which, by the way, are very difficult of proof; but the clinical history of by far the greater number shows that there was no disturbance of general health at all during the early years of the disease, and that it is a local breaking down of resistance, which allows the primary infection. Kirk notes, as an undisputed fact, "that sufferers from gout, or rheumatism in certain of its forms, are particularly prone to alveolar pyorrhœa invasions." Put in exactly opposite terms, that conditions called gout or rheumatism may be dependent on pyorrhœa—it is a valuable clinical fact. Chemical erosion of teeth (a rare condition) is another dental lesion directly traceable, according to the same author, to a constitutional element. He regards "the excessive use of carbohydrate foods, sugars, starches, alcohol, etc., in individuals of imperfect or insufficient oxydising power, as the cause of the constitutional vice or nutritional error, a local expression of which is chemical erosion of the teeth." In the issue for July 1901, it is stated that Ottofy examined the teeth of 113 Igorot children (Philippine Islands), and found 77 with sound teeth. There were 47 carious teeth among the remaining 36. In that for June 1908 is recorded a case showing the importance of moving the roots of the teeth in orthodontia, with illustrations of casts and photos of encouraging results in the treatment of inferior protrusion and subnormal maxillæ. Also Theo. Von Beust figures what he considers a new form of organism from the materia alba at the necks of teeth, and he considers that it might be called *Leptothrix falciformis*. In the May number, Isidore Lett records (1) a case of facial neuralgia, with severe paroxysms of pain, night and day, in the right mandible, neck and shoulder, due to a very shallow amalgam filling in a cervical cavity in the lower third molar. By replacing amalgam by gutta-percha, an immediate cure was effected. Also (2) a case of a child of three, with neuralgia of right side of face and neck of one year's standing. The right lower second temporary molar was missing, and, on cutting down, it was found inverted. Recovery followed removal. (3) Also a case of toothache, which was apparently premonitory of herpes.

In *Dental Cosmos* for February 1908 ("A Calcified Epithelial Odontome") Gibbs describes sections of a tooth, showing an enamel-lined cavity completely surrounded by dentine, and in that for April 1907, Bowles describes an adaptation of the microscope to the clinical uses of dentistry. A working distance of about 5 inches can be obtained, and the image is not reversed. In May 1907, A. C. Hagenschmidt records eczema of the lips as a result of using solol in tooth-powder, and in June, Miller describes and figures specimens of wasting of the teeth of lower animals, resembling, and perhaps identical with, what is known as erosion in man. In September 1907, it is stated that Doskori examined 114 tuberculous patients, and found in 11 of them retained deciduous teeth. He suggests that this condition may be due to a tubercular predisposition, and cites a case in favour of this view. Also Kjaer records a case of total absence of the permanent teeth. The temporary teeth had developed somewhat defectively, and been shed slowly. Skiagrams showed the jaws to be senile in appearance.

In *L'Odontologie*, February 28, 1907, J. Sordoillet records a case of purulent discharge of dental origin from the nose. The offending tooth was an unerupted canine.

The *Dental Surgeon* records a case in which a canine tooth, having been displaced upwards by a fall in childhood, caused fœtid nasal discharge at the age of 19, and was found lying between the lower and middle turbinated bones.

"Items of Interest," August 1907. W. O. Talbot records a case of double resection of the mandible in order to rectify bad inferior protrusion. The piece of bone, carrying the first molar on each side, was excised. Necrosis followed, and post-operative disfigurement, which spoiled the hoped for improvement of features. Mastication was greatly impaired.

British Dental Journal, September 15, 1908. G. Cunningham gives details of the successful working of a School Dental Clinic at Cambridge. The cost was defrayed by private charity. In the same issue A. Layton records the failure of a School Dental Clinic at Kettering, where very moderate fees were charged. State or municipal aid is called for (C. E. Wallis, *ibid.*) to remedy the dental ills of elementary school children, but are such people economically worth assistance?

Sim Wallace (*British Dental Journal*, July 15, 1908) strongly condemns the pap-feeding of children recommended by many authors at the period of weaning. He urges that solid bread or toast which the child sucks and slowly chews is a far more rational diet. Both from a diet and tooth point of view the article is worth reading.

British Dental Journal, June 1, 1908. Details are given of a case of a Foreign Body in the Trachea, in which the body (part of a tooth crown) was carried down during an inspiration, while the patient was fully conscious, and yet practically caused no symptoms. It was coughed up about a month later.

During the year, several cases of passage of roots or teeth into the lungs, during anæsthesia, have, as usual, been recorded. Some have ended fatally. The writer of these notes has more than once protested against the habit of using general anæsthetics for the extraction of any and every root or tooth, on the ground that their liability to slip from the forceps, and be lost down the throat, renders the operation very unsafe. Again, oral sepsis ought to be considered a serious bar to general anæsthesia; septic pus may be inhaled with any extra vigorous inhalation under "gas," or may trickle down during the later stages of other general anæsthetics, with resulting septic pneumonia and death.

British Dental Journal, February 15, 1908. T. W. Thew saw cocaine poisoning following injection of less than $\frac{1}{10}$th grain. The patient was seriously ill for some 30 hours.

Reich-Marburg (*Odontologische Blätter*, Nos. 5–6) records a case of double fracture of the mandible, in a child of six, due, as he thinks, to tubercular infection *viâ* necrotic temporary teeth.

K. W. Goadby (*British Medical Journal*, August 22, 1908) gives accounts of two cases of fulminating pyorrhœa alveolaris specifica successfully treated by vaccines.

THE "TREE-BRANCH" STRIATIONS OCCASIONALLY SEEN IN SKIAGRAMS OF TUBERCULOUS LUNGS.

By C. WILLETT-CUNNINGTON, B.A., M.B., B.C.

[With Plate XXV.]

A SKIAGRAPHER, accustomed to take many X-ray photographs of the chest, will from time to time come across plates revealing peculiar markings in the lung area. These markings are linear in shape, and, starting from the situation of the lung root, extend outward both in the direction of the apex and of the base of the lung.

They have a resemblance, in point of fact, to the branches of a tree reaching out from the trunk; like branches, too, these lines subdivide into "twigs" which frequently can be seen to end in fluffy nodules of shadow, the ultimate "foliage," as it were, of this pulmonary arborescence. Such "tree-branch" arrangements must have been noticed by many observers, but there does not appear to be much, if, indeed, any, comment made on the subject in the recognised works on skiagraphy. The purpose of this paper is partly to record personal observations, which possibly agree with those of other workers in skiagraphy, and partly to extract from others their views, coinciding or otherwise, on the points under discussion. I shall base my remarks upon cases which have come under my own notice, simply because there is so little at present recorded in the journals on the subject.

There have been already several tentative suggestions put forward to explain the nature of these "tree-branch" markings, namely, that they are shadows cast by—

(1) Arteries or bronchi; (2) normal lymphatics; (3) lymphatics containing siliceous matter or coal dust; (4) lymphatics swollen by inflammation.

None of these appear quite satisfactory, however. It is difficult to accept the suggestion that these markings are shadows of normal structures, because they do not present themselves in skiagrams of normal lungs.

If they were of arterial origin, one would expect the condition to be especially marked in patients suffering from arterio-sclerosis, but, so far as I am aware, this is not the case. Nor can they be due to lymphatics containing coal dust, seeing that they occur in patients who have not been specially exposed to dusty atmospheres. Most of my cases were women, often people who had lived a good deal in the country. Moreover, one does not find the "tree-branch" markings in such persons as coalheavers, colliers, etc.

One cannot accept the swollen inflamed lymphatics as a satisfactory cause, otherwise it should be seen most marked in simple bronchitis and similar diseases.

In my experience (and I know not how far this agrees with the experience of others), "tree-branch" arborescence only occurs in tuberculous patients, and in these to the extent of about 8 per cent. of cases examined. There seems to be nothing to suggest that the condition will be seen, in a given case, before examination.

In each case where I have found it, the patient showed unmistakable evidence of having had recently (within a year) pulmonary tuberculosis. One is forced to the supposition that the arborescence is caused by this disease.

The point has been raised as to how far the lines depend on the quality of the negative, produced, it has been suggested, by a happy chance combination of perfect exposure, perfect development, and perfect X-ray tube.

But against this, I would urge that the arborescence may be visible in poor plates as well as in good ones; also that many quite excellent plates of the majority of patients, healthy or tuberculous, show no signs of it.

It is quite possible that somewhat similar linear markings appear in negatives, taken with elaborate apparatus permitting an extremely short exposure. Such lines may be shadows of normal structures, but they are very different from the ones I am describing, seeing that these latter appear in negatives taken by an exposure of one or two minutes' duration; and, as I have said, in only a small percentage of cases, all of which are tuberculous. The condition, then, may be presumed to depend upon some unusual pathological change going on in the tuberculous lung.

I usually take the photograph with the plate against the back of the thorax; when I have also taken a second plate on the front, I have found that the "tree-branch" arborescence is very much better shown in the former plate. The clearer definition on the posterior plates suggests that the structures, whatever they may be, casting these linear shadows, are nearer the posterior surface of the lung than the anterior. I am not sufficient of an anatomist to say whether the pulmonary lymphatics correspond chiefly with this situation.

In all my cases, the lymphatic glands in the region of the root of the lung were markedly enlarged. This enlargement can be detected, to some extent, on a plate, but it is far more readily and certainly made out by screen examination. With this point in mind, one investigates the condition of the "retro-cardiac triangle," seen when the patient is in the lateral oblique position. This triangle is bounded by the heart in front, the spine behind, and the diaphragm below. On deep inspiration, a shaft of bright illumination courses momentarily upwards from the diaphragm.

In cases in which the mediastinal glands are enlarged, this triangle either fails to become luminous, or is only faintly so. In "tree-branch" cases, this triangle, in my experience, is always obscured. The markings appear to be always bilateral; that is to say, they do not occur in only one lung, but always in both, although not necessarily to the same extent in each. I am in the habit of photographing all quiescent tuberculous cases at intervals of a few months, and, by this means, it is possible to watch the changes taking place in the skiagraphic shadows, as convalescence continues.

The "tree-branch" lines undergo certain alterations as time elapses. I am referring, particularly, to cases in which the disease appears, clinically, to have become arrested, or to be steadily subsiding. I have not, as yet, found the condition in cases which were getting worse, nor yet in my early cases. Therefore one looks upon these markings as part of a curative change. Alterations continue in them for a considerable time, long after symptoms have disappeared. The lines, formerly sharply defined with their subsidiary branchings, cease to be so marked; becoming gradually distintegrated, until what was once a clear line appears as a row of discrete nodules. Some of these eventually disappear, while others become larger and denser.

It is too soon, at present, to dogmatise on the interesting question of their ultimate fate. For reasons already stated, one must look upon these lines as part of a recuperative, beneficial change going on in the lungs. There seems to be evidence for connecting "tree-branch" arborescence with fibrosis, seeing that ultimately these patients are apt to develop definite physical signs of fibrosis, detectable by the stethoscope. This tallies with the notion of a curative change, fibrosis being Nature's method of stamping out tuberculosis.

To arrive at a more satisfactory explanation of the markings than those mentioned at the beginning of this paper, it is helpful to compare, in a plate showing the condition, the relative densities of the shadows, where they appear in linear shape, and where they appear in the more usual nodular form. Roughly speaking, the arborescence shadow is less dense than actual fibrotic areas, and denser than the fluffy-looking patches which, in all probability, indicate areas of diffuse caseation.

Clinical experience shows that, when a patient's skiagram reveals masses of fluffy patches, resembling "cotton-wool," as it were, and very little dense nodules, the prognosis is bad. Such a patient is apt to have severe constitutional symptoms, and goes down hill. On the other hand, discrete nodules, not coalescing, lead one to form a more favourable prognosis.

From this one is led to suppose that the "woolly" appearance is due to degenerative caseation, and the denser nodules to regenerative fibrosis. How does this help to explain the nature of the "tree-branch" formation?

Remembering that it is associated with an active condition of the mediastinal glands, the suggestion may be put forward that the linear shadows are cast by lymphatics, crammed with products of tuberculous disease, caseated material, in fact, in the process of being carried from the more distant parts of the lung towards the lymphatic glands, there to be consumed. A certain amount is left behind, and this the lung tissue is able to cope with, converting it into, or surrounding it with, fibrous tissue. This would explain the ultimate dissolution of the tree-like branches into the discrete nodules, as already described. The fate of the patient would depend on the powers of the glands, which, like furnaces consuming deleterious matter, may become choked in the task, or may successfully perform the work thrust upon them.

The accompanying photograph illustrates, rather imperfectly, the condition described. It is necessary to remember that an X-ray print compares most unfavourably, in definition and detail, with the plate from which it has been taken.

PLATE XXV.

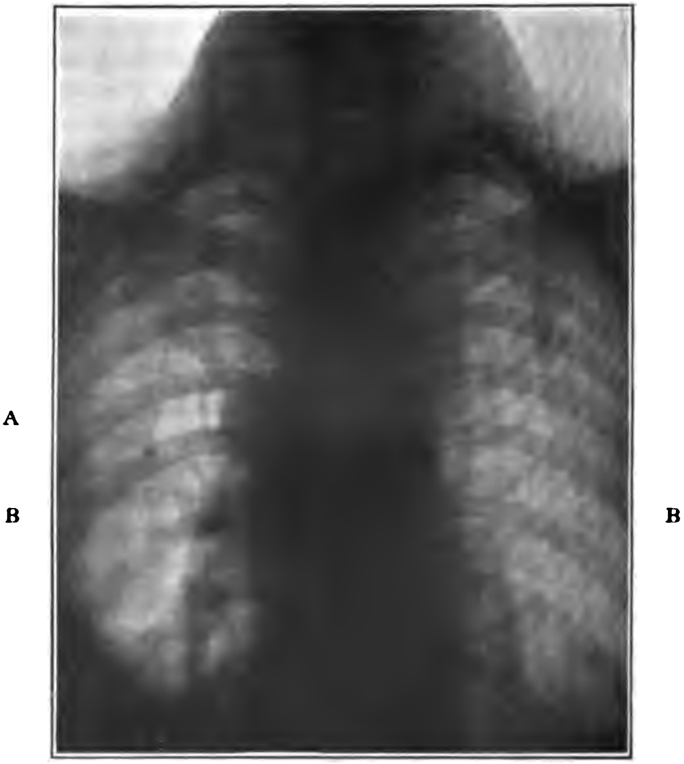

Fig 1.—*Photograph of chest, seen from behind, to illustrate "tree-branch" striations. These arise at the levels of the lung roots,* B B, *and course upwards and outwards.* A, *aortic bulge, unusually well marked. At the lung roots can be seen dark masses, the shadows of enlarged glands.*

In spite of the most careful printing and toning, much of what appears in the negative is lost in the positive. And, unfortunately, there is a further deterioration in effect, when a process block comes to be taken from the print. Consequently, it is extremely difficult to reproduce, in books and journals, many of the points visible in the negative itself. This may explain the disappointment, and perhaps the incredulity, felt when illustrated X-ray work is presented in medical literature.

The photograph shown (Fig. 1) is from a patient seen by a consultant, who diagnosed "definite tuberculosis at the right apex, with suspicious signs at the left." According to custom, the X-ray plate reveals far more than the stethoscope would lead an observer to suspect.

It is necessary to reiterate, and to go on reiterating, the truth of this statement, well known to all skiagraphers, until, ultimately it will have to be accepted by even the most accomplished clinician, who, at present, clings bravely to "delicate skilled percussion." It would hasten the happy advent, if the accomplished clinician would devote his spare time to examining a series of skiagrams.

The photograph, in the present instance, shows enlarged bronchial glands (more readily seen when the patient was examined by the screen), and the delicate branching processes extending with the lungs in all directions. The bulk of the disease, as is commonly the case, is in the more central parts of the lungs. As a rule, it is only later that it reaches the apices (where it becomes recognisable by the clinician). A second plate, taken six months later (the patient being in excellent health), revealed the breaking up of the lines, as described already.

Another case recently came under my notice, illustrating a rather earlier stage in the process. Six months ago (when the clinical symptoms were beginning to abate), the linear markings were just forming. A second plate, recently taken, shows the arborescence well established.

I have just seen a third case, in which the lines are only partly forming. The patient will be watched to see what develops.

I have ventured to record these personal observations in the hope that they may extract further information on this interesting point from others.

A NOTE ON THE DIAGNOSIS OF A FRACTURE.

By R. P. CROSBIE, M.A., M.B., B.Ch.,
Surgeon for Out-Patients' South Infirmary, Cork.

As a direct outcome of Dr. John Alexander McKenzie's paper in the October number of The Practitioner, in which he shows such interesting fractures in the small bones, and the exceeding importance of recognising and treating them, I should wish to give publicity to the following method of diagnosis, as an aid in cases in which fracture is suspected or doubtful, which I have employed and taught for some time, and which, so far as I know, has not been described.

In the professional life of all of us, I think, we sometimes meet a case, in which, from a legal, from a social, or a professional, point of view, it becomes of extreme importance for us to decide on the question of fracture or non-fracture of a bone. It is very often, in these very cases, that diagnosis is of extreme difficulty, and in which every help is gladly availed of. Of course, it would appear easy for the surgeon or practitioner to say, "Let us wait for the bone to be X-rayed," but, as a matter of experience, the present public are so hypercritical that they demand a definite opinion at once, and are apt to be severe on the powers of the surgeon who delays his decision for a radiograph. Besides, in spite of what Dr. Tyrrell Gray holds, in his able paper in the same number of The Practitioner, in all cases, we must take into consideration both public opinion, and our position as witnesses in legal cases, and welcome anything that would strengthen that position before either body.

To put the case briefly, every bone offers a certain resistance to the touch, on examination, which is the measure of its rigidity. The slightest fracture at once interferes with this rigidity, and, to the close examining finger, the bone is no longer rigid but yielding.

This rigidity, of course, varies with the size, strength, and age of a bone, being less in young bones, greater in adults, but an easily determined factor in all. For purposes of comparison we need but test one bone by its fellow, on the opposite side of the body, say one radius by another. This, though at first sight, may seem complicated, in practice becomes simplicity itself, and it is surprising how soon one gets to testing the bone itself with no reference to the other side of the body.

Of course, it is unnecessary in gross fractures, in which crepitus is obvious, and mobility exaggerated, but it is, in the fine work, that it has its part. For, excluding those lesions that are patent and declare themselves, how many cases do we meet with in which crepitus cannot be elicited, and which yet are undoubted cases of fracture.

Of course, up to now, crepitus is regarded as the only true diagnostic sign—pathognomonic—and indeed, when found, gives little need for further investigation, but it is so often absent, and when present so fleeting, or can only be produced by such violent methods, that gentler manipulation would be welcomed, by both surgeon and patient. To this end, we test the rigidity, or resistance of the bone, which is easily done by grasping the bone above, and below the point of suspected fracture, and noting any degree of lessened resistance. This symptom being established with the minimum of pain, demonstrating, as it does, the minutest movement between the fragments, there is no necessity to proceed to the larger, coarser, and more painful movements of producing crepitus, and what is styled "preternatural mobility, of which it is the ultimate expression." There are fallacies in the method (rickets, tubercular bone, etc.), but what method has not? Are there not fallacies in connection with the other two?

It is applicable to all long bone-fractures, but of special use in carpal, phalangeal, rib, and fibular fractures. It demonstrates partial fracture. It is our best test for greenstick fractures without displacement, for in these our classical tests fail. It is best demonstrated in the greenstick fracture of the clavicle in a child, where we can observe the resistance of the bone as it knits, growing stronger and stronger to the examining finger day by day.

It is surprising to see how quickly students take to the method, for, even they sometimes feel disgusted, on seeing a large class inflicting the more painful methods on a patient.

Personally I never feel for crepitus, and yet deal with a large number of cases on these lines.

NOTES FROM FOREIGN JOURNALS.

ABORTIVE TREATMENT OF ACUTE OTITIS MEDIA.

Obermuller reports excellent results obtained by the use of Professor Kessel's treatment of acute otitis media in the earlier stage. It very often suffices to stop altogether the further development of the affection. The procedure is extremely simple, and consists of instilling into the affected ear one drop, every hour, of a 10-per-cent. solution of extract of opium in anhydrous glycerine. The patient remains lying on the sound ear for at least 10 minutes. The rapid soothing effect depends entirely upon the density of the glycerine employed, which should be of sp.g. 1,026. It is a matter of osmotic action. The fluid, filling the tympanic cavity, tends to pass through the membrane into the external auditory canal, whilst the glycerine and opium passes into the middle ear. Osmosis is the more rapid, and the soothing effect is the more quickly obtained, the higher the concentration of the glycerine. The passage of even minute quantities of opium into the tympanic cavity is proved by the hypnotic effect of this drug, especially in children. Obermuller has never observed the least intoxication by opium, and there is nothing to fear from the large amount of the drug used in the prescription. Although the soothing effect makes itself felt from the first instillation, the treatment must be carried on every hour. At the end of 24 hours, the intense redness, which was present, has disappeared, giving place to a grey appearance; soon afterwards, only some injection of the vessels of the malleus can be noticed. The bulging of the membrana gradually disappears. It is understood that, in order to produce an abortive effect, this procedure is only applicable during the first 24 hours, or at most 48, after the onset of the initial pain. (*Münch. medizin. Wochenschr.*)

HYDRATE OF AMYLENE IN ECLAMPSIA.

Following Naab's recommendation of intra-muscular injections and enemata of hydrate of amylene in *status epilepticus*, Härle has treated several patients suffering from this condition, and confirms the extremely satisfactory results to be obtained. He used almost exclusively intra-muscular injections in doses of gr. xlv. to ʒij. Only in rare instances was it necessary to repeat the injection. As a rule, the injection is very quickly followed by cessation of the convulsions and quiet sleep. Nothing untoward was observed.

Härle also tried the effect of the drug in cases of eclampsia, accompanied with intense excitement and eventually with paralysis of the cerebral cortex and other cerebral centres. One patient was in deep coma, and another had highly albuminous, though very scanty, urine. In every case he injected gr. xlv. to ʒi. of amylene hydrate into the gluteal muscles. After the injection the patients had no more fits, but went off soundly to sleep, An injection of one-sixth of a grain of pilocarpine was always given at the same time.

Härle has had good results from this drug in desperate cases of renal dropsy. The action of pilocarpine on renal secretion, a moot point with some, was clearly in evidence in one case in which catheterization had shown the bladder to be empty, while a few minutes after an injection of gr. ⅛th of pilocarpine, the patient passed a fairly large amount of water. The use of the drug in eclampsia appears justifiable, in order to open all the emunctories, and to stimulate all the secretions, including the renal. Labour occurred in Härle's five cases after the amylene treatment, and all the patients made a good recovery. In Kobert's work on intoxications, he mentions a case, in which nearly seven drachms of amylene hydrate were taken without lasting effect. He attributes to this substance a narcotic action, paralysing sensation, motility, and the reflexes. Unlike chloral it has no effect on the heart. For these reasons it would seem to be eminently suitable for use in eclampsia.—(*Münch. medizin. Wochenschr.*)

THE PURGATIVE PROPERTIES OF PHENOLPHTHALEIN.

Berthoumeau and Daguin have made a very complete physiological and chemical study of this drug. They have come to the conclusion that it possesses a laxative action in a dose of 4 to 5 grains for the adult, taken in a cachet about two hours after the evening meal. The effect is obtained in ten or twelve hours without any colic. For children half a grain to three grains (the latter at 15 years of age) should be given in pastilles. The taste is insipid and the drug is therefore easy to give. It is quite harmless as regards the digestive functions, and produces no notable changes in the other functions. Hence, in practice, it has a large field for usefulness.—(*La Presse Médicale.*)

TREATMENT OF FRACTURE OF THE OLECRANON.

A discussion on this subject, at the Société de Chirurgie, was introduced by Lucas-Championnière, who reported a case for Lenormant, in which the fracture, treated at once by massage, showed a very satisfactory result. He took advantage of this fresh instance to recommend this method of treatment, which he esteems very highly indeed. He was supported by Morestin, who now very rarely resorts to suture. Routier quoted, in support, the case of a young woman who threw herself out of a window on the fifth floor, and was brought into hospital in a comatose condition. She recovered from this fairly quickly, and it was not until three weeks afterwards that she was found to have a fracture of the olecranon with wide separation. Treatment by massage was adopted and resulted in a very satisfactory consolidation. Piqué also gave instances of the good effects of massage. Quénu, Tuffier, Broca, and Demoulin were more eclectic in their opinions. They consider that suturing is formally indicated when the upper fragment is turned over, and when the separation is considerable. Quénu sutures when there is separation which is noticeable. Peripheral suture without intra-osseous points was advocated by some; others, including Delbet, preferred the metal intra-osseous suture. The discussion was useful as showing that, in isolated districts, or when help is not available, fractures of the olecranon can be treated by massage with far greater success than is the case with fracture of the patella. There are, however, certain cases, in which only co-aptation of the fragments with a metallic suture will ensure an ultimate good result.—(*Revue de Thérapeutique médico-chirurgicale.*)

TREATMENT OF DIPHTHERITIC PARALYSIS WITH ANTITOXIN.

Descos and Vial confirm Sicard's opinion to the effect that diphtheritic paralysis, which tends to become generalised, is nearly always fatal, unless treated with anti-toxin.

They report the case of a young woman, of 23 years of age, whose limbs were all paralysed and defied treatment. The paralysis appeared to be spreading to the heart and lungs, but was almost immediately improved by an injection of anti-toxin. Complete recovery followed very quickly. In 8 days, 5 injections of antitoxin, in all 110 c.c., were given. An objection may be raised on the score that diphtheritic paralyses tend to spontaneous recovery, notably when the palate, the tongue, and even the eyes are affected, but paralysis of the limbs shows no tendency towards recovery; in fact, it seems to get worse. Any generalised paralysis after diphtheria should be look upon as serious. A fatal ending is far from uncommon.

The treatment of paralysis by antitoxin is a recent introduction by Comby, whose observations on the point are very convincing. He insists that every patient, attacked by diphtheritic paralysis, whatever its form or localisation, ought at once to be given an injection of antitoxin, which should be repeated for three or more days following, according to the gravity of the case. The dose should be 10 to 20 c.c. at each injection.—(*Revue de Thérapeutique médico-chirurgicale.*)

The same subject is dealt with by Professor Kohts in the July *Therapeutische Monatshefte.* He is quite convinced of the good effect of the treatment by antitoxin, and gives short details of ten cases under his own observation, all of whom were completely cured. The general treatment, he says, must be tonic and strengthening, but the only radical treatment of diphtheritic paralysis consists in combining the diphtheritic poison with the antitoxin, in order to arrest the general cell-degeneration. For this purpose, in Comby's opinion, the use of large doses of diphtheria-serum is necessary. As the best means, Kohts has made use of Behring's antitoxin, giving in the course of the illness 12,000 to 30,000 units, without any ill-effects on the patients. If there are any signs of the heart failing, he recommends caffein combined with digalen. Heart-failure, occurring as it often does in diphtheritic paralysis, is a constant source of anxiety. Absolute rest in bed must be strictly enforced, and all sudden movements prohibited. In the case of children constant watching is necessary. Stimulants are required, and in heart paralysis, as well as in all other diphtheritic paralyses, the best is strychnine by hypodermic injection. Kohts has found that for children a dose of 1 m.g. (gr. $\frac{1}{64}$th) of nitrate of strychnine and even 6 to 8 d.m.g. (gr. $\frac{1}{100}$th to $\frac{1}{80}$th) is too much, producing some rigidity in the back and contraction of the muscles of the lower limbs. He therefore limits his doses to 3 to 6 d.m.g. (gr. $\frac{1}{200}$th to $\frac{1}{100}$th). In high degrees of paralysis, this dose can be repeated as often as necessary. In slighter cases, two drops of tincture of nux vomica should be given after each meal.

Reviews of Books.

The Edinburgh Stereoscopic Atlas of Obstetrics. By G. F. BARBOUR SIMPSON, M.D., F.R.C.P. Eng., Senior Assistant to the Professor of Midwifery in the University of Edinburgh, and EDWARD BURNET, B.A., M.B. London: The Caxton Publishing Company. In four Sections, each containing twenty-five subjects, with descriptive text. 84s. net.

THE first section of this atlas consists of twenty-five stereoscopic photographs of normal and abnormal pelves, to which is added a very brief but careful letterpress, in which the salient features in each pelvis, from the standpoint both of the pathologist and the practical obstetrician, are very clearly indicated. In the forthcoming sections, due attention will be paid to the internal organs of generation, and the atlas will be completed by a series of stereograms illustrating normal and abnormal gestation and labour.

Along with Sir J. Halliday Croom, who contributes the preface, we welcome this atlas as a very important addition to our teaching power.

Injuries of Nerves and their Treatment. By JAMES SHERREN, F.R.C.S. Eng. London: James Nisbet & Co. 5s. net.

THIS is a clinical monograph on nerve injuries and their treatment, and contains a concise and complete, though not exhaustive, account of the subject. Mr. Sherren considers that, when a nerve is completely divided, degeneration follows in the whole peripheral end; before conduction can be re-established regeneration must take place. He states that all recent experiments have failed to demonstrate the existence of "primary union," and the clinical evidence is equally negative, and that, when every case of nerve division is carefully tested before as well as after suture, no more will be heard of primary union.

Mr. Sherren has written an excellent account of his subject, based on an extensive personal experience, and his account is freely illustrated, the illustrations being, with three exceptions, original.

Handbook of Surgery. By GEORGE BURNSIDE BUCHANAN, B.A. (Cantab.), M.B., C.M., F.F.P.S. (Glasg.); Assistant-Surgeon, Western Infirmary, Glasgow; Assistant-Surgeon, Glasgow Cancer Hospital. Pp. xv + 447. Edinburgh: John Currie. 9s. net.

THE author explains the appearance of his book, as fulfilling a demand for a short handbook, somewhat on the lines of the earlier editions of Walsham, by those who wish to revise their knowledge of surgery before examination. The general lines of treatment are indicated, but the author has purposely refrained from giving more than this. In compiling his book, Dr. Buchanan has carefully consulted a goodly list of leading authorities; the information afforded is, therefore, in every respect trustworthy.

The Major Symptoms of Hysteria. Fifteen Lectures given in the Medical School of Harvard University. By PIERRE JANET, M.D., Professor of Psychology in the Collège de France. London: Macmillan & Co., Ltd.

As indicated by the title of the book, these Lectures on Hysteria, a special branch of Pathological Psychology, were delivered, by request, to the students of the Medical School of the Harvard University, and they afford an opportunity for exceedingly interesting reading. Dr. Janet is evidently an enthusiast in the study of Psychology, and has embodied much useful information in his lectures, the style of which is captivating, but slightly too declamatory to be of the best didactic form. At the same time, he shows pretty clearly how somnambulism, double and multiple personalities, certain forms of paralysis, troubles of vision, of speech, and of alimentation may be traced to Hysteria. In fact the general scope of the book may be gathered from one of the concluding remarks in it. In his final lecture, Dr. Janet says: "In these lectures on the great symptoms of hysteria, I have tried to present a rapid picture, not of all the symptoms of hysteria, but of the essential ones, in order that you might form a just idea of a singular malady of which everybody speaks, and which but few physicians know well." From this may be gathered that, out of a wide experience, and, as a result of careful observation and reflection, the author of these lectures has advanced theories, and formed conclusions, which merit the thoughtful consideration of all medical practitioners.

The Practical Medicine Series, comprising ten volumes on the year's progress in Medicine and Surgery, under the general editorial charge of GUSTAVUS P. HEAD, M.D., Professor of Laryngology and Rhinology, Chicago Port-Graduate Medical School Series, 1906. Chicago: The Year-Book Publishers, 40, Dearborn Street. United Kingdom: Gillies & Co., Glasgow.

THIS series is published for the general practitioner, but the division into ten volumes, each devoted to a special subject, allows a choice to be exercised by the purchaser, who, at the same time, can be sure that he is getting the information at greater length and in further detail than is possible in annuals, in which the whole of the subjects are condensed into one volume. The volumes are of handy size, and each has its special editorial staff. The information is garnered from the leading medical publications of the civilised world.

Diets in Tuberculosis: Principles and Economics. By N. D. BARDSWELL, M.D., M.R.C.P., Medical Sup., King Edward VII. Sanatorium, and J. E. CHAPMAN, M.R.C.S., Medical Sup., Coppin's Green Sanatorium. London: Oxford Medical Publications. 6s. net.

THE principles of treatment, which Drs. Bardswell and Chapman consider, offer to the consumptive the greatest hope of recovery, consist of:—The carefully-ordered life, with freedom from fatigue and worry; carefully-regulated hours of rest and exercise; and, most important of all, abundance of fresh air and generous but not excessive feeding.

In this volume we find discussed the best principles upon which dietaries for consumptives should be constructed; the best lines upon which an efficient dietary can be economically constructed; and the minimum cost at which a suitable dietary can be bought retail, as well as a detailed consideration of the comparative nutritive and economic values of various food-stuffs, with special reference to the dietetic treatment of consumption. Drs. Bardswell and Chapman are to be congratulated in producing a book of real value.

Notes by the Way.

To our Contributors and Readers.

THE present number completes the eighty-first volume of THE PRACTITIONER and rounds off another year's work. It is an appropriate time for taking what we once heard a preacher with the gift of pleonasm term "a retrospective glance backwards over the past"; and we trust that all our subscribers can survey the past twelve months with as much satisfaction as ourselves. Our hearty thanks are due to the many men of eminence in various branches of the profession who have contributed the results of their scientific researches and the fruits of their clinical experience to our pages, and we have also to thank our subscribers who have signified their kind appreciation of our endeavours. The support accorded to us by both these sections of the profession has been of a very encouraging and gratifying character; and the relation between the two kinds of support is doubtless that of cause and effect. The commencement of another New Year will be upon us before our next number can appear. We anticipate its advent in an optimistic spirit, convinced that it will bring us opportunities of still wider usefulness.

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Tuberculous Butter.

NOT the least interesting of the subjects discussed at the Washington Congress on Tuberculosis was the possibility that butter is sometimes an active agent in the dissemination of the disease; the actual facts set forth being as follows:—The United States Department of Agriculture had tested 775 samples, and detected the presence of the bacillus in 12 per cent. of them. Guinea-pigs were then inoculated with a view to ascertaining the significance of this fact and how long the bacillus would remain virulent in butter containing one ounce of salt to the pound. The subsequent post-mortem examination of the guinea-pigs showed that the infected salt butter was still infectious after a lapse of 99 days. It would probably be difficult to persuade an epicure to prefer salt butter to fresh, even if it could be demonstrated to him that salt sterilised it effectively; but the results of the experiment are none the less fraught with importance, and call for careful consideration. Milk, being a more perishable article than butter, is not imported; milk that is found to be tuberculous can be traced first to a particular farm, and, in the last resort, to a specific cow. In the case of butter this detective process is impossible. It comes to us in bulk from the remotest ends of the earth, not merely from Normandy and Denmark but also from Canada, Australia, and Siberia; and there are no obvious means by which we can deal with the danger at the source. Indeed it is difficult to say what we can do in the matter, at the moment, except instruct ourselves further by means of more experiments. When the different butters derived from different exporting centres have been compared, the way will at least be better prepared for the drafting of a plan of campaign.

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The Notification of Tuberculosis.

THE question of the compulsory notification of tuberculosis, about which we spoke at some length last month, was also, as a matter of course, debated at the Congress where London had the advantage of learning the results of the experience of New York. The most important lessons derivable from that experience are these. In the first place it is made clear that compulsory notification does operate as a check upon infection; in the second place it is demonstrated that the popular hostility to it rests upon misapprehension, and declines to vanishing point when its beneficial consequences are perceived. That would not be the case, of course, if the hard measures advocated by the extremists were adopted. The herding of consumptives in compounds or reservations would hardly be tolerated even in the most police-ridden countries. There would be some active resistance to it, and passive resistance would be widespread. Cases would be concealed, at all events in their early stages; and people with coughs would make a practice of dosing themselves with proprietary cough mixtures instead of asking the doctor to prescribe. The New York rule has been, however, not to molest, but merely to help, the patients who can be, and are, careful about infection, and only to interfere with those who, in spite of assistance rendered and warning given, continue a carelessness which constitutes a public danger; and to that amount of interference there has been no marked opposition. It is not in the least likely that we shall go further in this direction than the State of New York has gone, but we might be wise to go as far—a little further, that is to say, than the latest Administrative Order of the Local Government Board goes.

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Sanatorium Treatment.

THIRDLY, concerning sanatorium treatment and the curative influence of climate. On both these subjects there was general agreement that some theories, to which we were still clinging only a few years ago, and which have not even yet been universally abandoned, need modification. The policy of overfeeding found few friends, and the doctrine that all consumptives must be kept at rest was renounced. The ends to keep in view in directing the treatment of tuberculosis are the improvement of the patient's general health, and the raising of his muscular tone. It does not follow that, because a good appetite is a sign of good general health, the undue forcing of the appetite conduces to it; and there is nothing which raises the muscular tone like exercise, provided, of course, that it is the right sort of exercise and rightly regulated. The Brompton Hospital Sanatorium is now working, with good results, on that hypothesis. Light work, and even in suitable cases, hard work, are often prescribed there. It is found that work, in addition to its specific direct effect on the muscles, has a valuable indirect influence upon the mind. It prevents patients from worrying, and the cases in which work is more deadly than worry are very rare indeed.

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Climate.

THE truth about climate is on the same lines as the truth about work and exercise. The view used to prevail that certain specific climates—some people said hot climates, and others said cold climates—were specifically beneficial. They are, in fact, beneficial or the reverse only in so far as they improve or depress the general health; and the practice of exporting pulmonary patients to Canada or South Africa, with the vague idea that they will "do well" there is to be discouraged and deplored. Even when the climate is bracing, the other conditions are often unfavourable. The strange environment is a handicap in the struggle for life; and the immigrant easily relapses and becomes a source of infection and a danger to his fellows. One can understand that the self-governing colonies are reluctant to receive such guests, and in some cases even go so far as to deport them if they develop the disease within three years of their landing. This liability to deportation is a fact which doctors should bear in mind when they think of counselling even those, whom they can merely class as "delicate," to seek a new home across the seas.

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The London Milk Supply.

It has been said by the enemies of the London County Council Moderates that one of the causes which placed them in power was the fond belief of milk vendors that they would not be too particular about the purity of the metropolitan milk supply. They nevertheless propose to promote legislation in the Session of 1909 authorising the exclusion from the county area of "milk which, on inspection, is found to be dirty and to cause contamination." What is really wanted is a general Act dealing with the question generally throughout the country; but, if, as seems likely, the Government have no time for such a measure, the County of London ought certainly to have the opportunity of dealing with it provisionally in this manner. With regard to tuberculous milk, the requisite authority has already been given; but tuberculous is only one among many evils which contaminated milk may spread. If general legislation on the subject is presently introduced, it will be an easy matter, as the Public Health Committee points out, to repeal such clauses of the General Powers Act as clash with it.

Practical Notes.

COCCYGODYNIA.—This is the name given to a painful affection of the coccyx and the surrounding parts, which is occasionally met with in women. The symptoms consist of pain in the coccyx and adjacent structures, which is usually relieved by rest, and aggravated by exertion. The pain is produced by anything which puts the coccyx on the strain, such as direct pressure, or muscular contractions. Thus it occurs when the patient sits down, during defæcation, coitus, and on any sudden movement or jolt, and the coccyx may be so tender that she can only sit upon one buttock. The pain varies much in severity, from a dull heavy ache to one of great severity, and may be so acute, especially on sitting down or getting up, that the patient is quite unable to rise without assistance. The condition may be due to local or general causes. The local causes are always of a traumatic nature, and most commonly those which occur during parturition. Hence the condition is rare in children and in nulliparæ, and especially likely to be met with in elderly primiparæ, in whom the sacrococcygeal joint is rigid and ankylosed. As the result of a difficult or instrumental labour, the coccyx may be dislocated, contused, or fractured, or become fixed in an abnormal position, usually at right angles to the sacrum, or the muscles or ligaments may be stretched and torn, and even ostitis, or necrosis of the coccyx may ensue. Non-puerperal injuries causing coccygodynia are various forms of external violence, such as a kick, blow, or fall on the buttocks, or falling astride some narrow object, such as the back of a chair. The general causes include rheumatism, and neuralgia of the surrounding muscles and ligaments, and the condition may be a pure neurosis.

The diagnosis is made from a consideration of the history of the case, or by means of a physical examination, by which it can readily be differentiated from vaginismus, hæmorrhoids, and anal fissure, which present a somewhat similar symptomatology.

When the condition is found to be due to a local lesion, coccygectomy, or excision of the coccyx, should be performed without delay; when due to general causes, the treatment must be undertaken on general medical principles. The rheumatic or gouty tendency and neurasthenia must receive appropriate general treatment.

Local medical treatment consists in the application of ointments, suppositories, blisters, cauterisation, or electricity.

A sedative ointment rubbed into the skin of the coccygeal region sometimes gives relief. A very efficacious ointment consists of:—

℞ Tr. Aconiti - - - - ʒss,
Ung. Belladon. - - - ℥j.
Misce. Ft. unguentum.

As regards suppositories, the following will be found useful:—

℞ Supposit. Belladon. - - - gr. ss. or
℞ Supposit. Iodoform. - - - gr. x.

For blisters, the ordinary Emplastrum Cantharides should be employed in the form of strips, half an inch wide, applied to each side of the coccyx. These are often efficacious in controlling the pain.

The actual cautery constitutes the most certain remedy we possess for the relief of coccygeal pain. A Paquelin cautery is used to cauterise the skin over the sacral foramina on each side, the skin being burnt deeply, and the resulting eschar is then treated as an ordinary granulating wound. This method should be tried when all others have failed.

Electricity in the form of the galvanic or faradic current may be applied directly over the coccyx, especially as an adjunct to the other methods of local treatment, and seems to be of service.

PICRIC ACID IN CERVICAL "EROSIONS."—Cervical "erosions," when not caused, or aggravated, by the constant irritation of discharges from the uterus, may often be cured by the local application of powerful caustics, such as pure nitric acid. Excellent results may be obtained by swabbing the erosion, once or twice a week for a few weeks, with a saturated alcoholic solution of picric acid. It is easily applied on a cotton-wool swab through a Fergusson's speculum, and is entirely free from pain and other inconveniences.

VERATRUM VIRIDE IN PUERPERAL ECLAMPSIA.—The convulsions in puerperal eclampsia constitute the most striking manifestation of this disease, of which the exact nature and origin are still unknown. Moreover, the convulsive fit is itself a source of great danger to the patient, especially when frequently recurring, after brief intervals, and producing important circulatory disturbances. Thus the increased blood pressure, produced by the convulsion, acting upon blood-vessels, already altered by the eclamptic poison, may cause their rupture, and so lead to cerebral hæmorrhage. Again, pulmonary œdema and aspiration pneumonia not uncommonly result from the convulsions, and are among the common causes of death in eclampsia. In these circumstances, any drug, which will control this most dangerous symptom of eclampsia, is likely to have a good effect on the disease itself. This result has been secured by the hypodermic administration of the fluid extract of veratrum viride in small and repeated doses. The character of the pulse must be taken as the guide in its administration. Where the pulse is full and strong, above 80 beats per second, veratrum should be administered. On the other hand, where the pulse is rapid and small, and the arterial pressure is but slightly elevated, veratrum viride is contraindicated. A recent Italian writer has treated 100 cases of eclampsia in the last ten years in this manner, with a maternal mortality of 12 per cent., and a fœtal mortality of 43·37 per cent., whereas, in the preceding ten years, before the introduction of the use of veratrum viride, he had a maternal mortality of 23·68 per cent.

◆

Preparations and Inventions.

GUAIACOSE.

(London: The Bayer Company Limited.)

Guaiacose, or liquid guaiacol somatose, is a combination of somatose with calcium-guaiacol-sulphonate. Both creosote and guaiacol have been used with very considerable benefit in cases of tuberculosis, but their taste and smell have been repugnant to the patient. Moreover, they occasionally upset the digestion. Guaiacose, which contains the active antiseptic principle of creosote in a non-poisonous form, is free from unpleasant taste and smell. It, moreover, contains calcium salts, which certainly aid the healing process in tuberculous disease of the lungs. Guaiacose is supplied in 6 oz. bottles, the average dose for an adult being three to four teaspoonfuls and for children one to two teaspoonfuls.

ARYLARSONATES.

(London: Messrs. Burroughs Wellcome & Co.)

It is well known that arsenic is a valuable drug remedy in many of the diseases due to protozoa, and is especially indicated in cases of syphilis, malaria, and trypanosomiasis. Arylarsonate salts should not, however, be administered by the mouth, as they are broken up by the free hydrochloric acid of the gastric juice. Freshly-prepared solutions should be administered subcutaneously, or by intra-muscular injection.

The three preparations submitted to us may be obtained either in powder or in tabloid form.

"Soamin" is sodium para-amino-phenyl-arsonate, and is readily soluble in water. It contains 22·8 per cent. of arsenic in organic combination, and is very much less toxic than arsenious acid. It is especially useful in cases of syphilis.

"Kharsin" is sodium 3-methyl-4-amino-phenyl-arsonate, and is soluble in two-and-a-half times its weight of water. It contains 23·7 per cent. of arsenic.

"Orsudan" is sodium B-methyl-4-acetylamino-phenyl-arsonate. It is anhydrous, and is soluble in three times its weight of water. It contains 25·4 per cent. of arsenic, and is less toxic than "Soamin" and "Kharsin." It is found to be particularly useful in cases of malaria.

GENERAL INDEX
TO VOLUME LXXXI.

INDEX TO SUBJECTS.

For List of Places and Diseases, referred to in Articles on Health Resorts and Climatic Treatment, see pages 213–216.

A.

PAGE

Abdominal Surgery, Recent work in (Harold Upcott) - 438
Aged, Climates suitable for (Sir Hermann Weber) - 1
Air, Change of, in young, adult, and early middle life (F. Parkes Weber) - 16
Altitudes, Influence of high (W. R. Huggard) - 95
Amyotonia congenita - 560
Anæmia, Arsenic in - 603
Anæmia pernicious, Symptoms and condition of blood in (J. G. Taylor) - 320
Anderson, R. E.: Pau and Argelès - 151
Anthrax - 843
Anus, Spasm of, causing crying in infants - 337
Aphasia, New views on - 301
Arsacetin and Sabromin - 760
Arsenic in Anæmia - 603
——, Active agent in treatment by - 337
Arterio-sclerosis, Nervous manifestations of - 297
——, Pathogenesis of (E. H. Colbeck) - 768
Arylarsonates - 880
Asthma, dyspnœa, and stomach-cough - 600

B.

Bannatyne, Gilbert A.: Bath - 66
Barker, Arthur E.: Pre-operative treatment of non-malignant gastric disease - 489
Battle, Wm. Henry: On the diagnosis of iliac swellings - 217
Beatson, Sir George T.: Two cases of multiple congenital deformities (illustrated) - 761
Bier's method of passive congestion (A. W. Wakefield) - 566, 654, 846
Bishop, E. Stanmore: The evolution of the modern operation of hysterectomy 776
Bottentuit, E.: Plombières - 144
Brandt, G. H.: The three Estorils - 104
——, J. Egerton: Royat - 135
—— ——: Mont-Dore - 137
Broadbent, Sir Wm. H.: Leaders in Modern Medicine (illustrated) - 329

C.

PAGE

Cammidge's C-reaction for diagnosis of pancreatitis, etc. 483
Camptodactylia 600
Cancer of the breast, Indications for operation (T. C. English) 389
Canney, H. E. L.: Egypt and North Africa 198
Carr, J. Walter: Health resorts and climates for children 12
Catarrhs, Ems treatment of respiratory (Albert Vogler) 31
Cervical erosions, Picric acid in 878
Chaplin, Arnold: Voyages to the East 194
Charteris, F. J.: Climate and health resorts of Scotland 73
Children, Health resorts and climates suitable for (J. Walter Carr) 12
——, Recent work in diseases of (Geo. F. Still) 702
Cholecystitis, Review of 46 operations for (Hugh M. Rigby) 819
Cholera in Russia 752
Cholelithiasis, early recognition and treatment (B. G. A. Moynihan) 830
Climate 875
Coccygodynia 877
Colbeck, E. H.: The pathogenesis of arterio-sclerosis 768
Colon, Idiopathic dilatation of 456
Colour vision and other senses (illustrated) (G. Arbour Stephens) 540
Congestion, History of treatment by 567
——, Method of producing 574
——, Objections to use of 583
Conjunctivitis, Angular 755
Cormack, C. E.: Vichy 141
Corner, Edred M.: Fracture and refracture of patella (illustrated) 498
Coryfin 488
Cottet, J.: A note on Evian 148
Coutts, J. A.: West Indies with especial reference to Jamaica 186
Credulity and mockery 209
Crosbie, R. P.: Note on the diagnosis of fracture 866
Croup and morphia 467
Cunning, Joseph: Recent advances in surgery 426

D.

Deaf-mutism (Duncan M. Mackay) 586
Deformities, Two cases of multiple congenital (illustrated) (Sir George T. Beatson) 761
Dental surgery, Review of (J. G. Turner) 857
D'Estrèes, Debout: A note on Contrexéville waters 149
Diagnosis, Difficulties of (Arthur J. Hall) 371
Diphtheritic paralysis, Treatment of, with antitoxin 870
Duodenal dyspepsia 338
Dysphagia in tuberculous laryngitis 741
Dyspnœa, asthma, and stomach-cough 600

E.

PAGE
East-coast climates (J. T. C. Nash) 56
Eclampsia, Treatment of 468
——, Hydrate of amylene in 868
——, Veratrum viride in puerperal 879
EDGECOMBE, WILFRID: Harrogate 68
Empyema and suppurative pericarditis in children (G. F. Still) 704
Ems treatment of respiratory catarrhs (Albert Vogler) 31
Endocarditis, Infective or ulcerative (Nestor Tirard) 629
ENGLEMANN, F.: Kreuznach 165
——, G. S. F.: Saline treatment of scrofulous lesions 26
ENGLISH, T. CRISP: Cancer of the breast, indications for operation 389
English spas considered therapeutically (Arthur P. Luff) 60
Enteric fever, Treatment and prevention of infection in (A. K. Gordon) 258
Epilepsy, Treatment of 466
EVE, FRANK C.: Recent advances against the tubercle bacillus 406
EWART, WM.: The evolution of the preventorium 24

F.

Feeble-minded 615
FENTON, W. J.: Adherent pericardium 637
Flies, Destruction of, by Formol 466
FORBES, N. HAY: Church Stretton 70
Foreign bodies in the conjunctival sac, the cornea, and sclera 757
—— —— —— ear 757
—— —— —— nose 756
FOSTER, MICHAEL: Italian Mediterranean sea-coast 119
FOULERTON, A. G. R.: Climate and health resorts of South Coast 50
Fracture, Note on diagnosis of (R. P. Crosbie) 866
Freckles 348
——, Treatment of 349

G

Gastric disease, Pre-operative treatment of non-malignant (A. E. Barber) 489
—— ulcer (L. H. L. Mackenzie) 669
Gastritis septic due to oral sepsis 744
Gastro-enterostomy 442
GILCHRIST, A. W.: La Bourboule 138
Glanders 843
GOMPERTZ, R., and R. PARNELL: Neoplasm of the kidney 737
Gonorrhœa latent in the female 485
—— prostatic, Infection in 555

PAGE

Gonorrhœal arthritis, Bier's method in (A. W. Wakefield) - 854
GORDON, A. KNYVETT: Experiments in the treatment and prevention of infection in enteric fever - 258
Gout, Bier's method in (A. W. Wakefield) - 853
——, Treatment of (Professor W. Weintraud) - 39
GRAY, H. TYRRELL: End-to-end apposition in long bone fractures (illustrated) - 533
GROEDEL, J. M.: A note on Nauheim baths - 169
GRUBE, Karl: Neeuenahr - 160
Guaiacose - 880
Gynæcology, Recent work in (Hugh Playfair) - 273

H.

HADFIELD, P. HEYWOOD: Health with pleasure in Norway - 125
HALL, ARTHUR J.: Difficulties of diagnosis - 371
HAMEL, GUSTAV: Zander method of treatment - 44
HARRIS, WILFRED: Review of recent neurological literature - 556
HARTLEY, P. HORTON-SMITH: Health, &c., of Midland counties - 46
HAYES, W. A.: Health and travel in South Africa - 205
Heart affections, Spa treatment of (James Mackenzie) - 34
Hemiplegia, Deviation of the tongue in - 560
—— Two symptoms in - 603
Henoch's purpura, Painful abdominal crisis in - 601
HICKS, H. T.: Pyelitis during pregnancy - 419
Holidays - 754
HORT, E. C.: Italian and Swiss lakes - 115
HUGGARD, W. R.: Influence of high altitudes - 95
Hyperidrosis, Treatment of, by Formol - 336
Hysteria - 376, 378
——, Abnormal signs in - 558
Hysterical paralysis - 380
Hysterectomy - 304
——, Evolution of modern operation of (E. Stanmore Bishop) - 776

I.

Iliac swellings, On the diagnosis of (Wm. H. Battle) - 217
Imprisonment, Educative - 753
Industrial diseases (Alexander Scott) - 837
Infanticide - 752
Injections, Intravenous - 485
Intestinal hæmorrhages, Treatment of, by hot enemata of gelatine - 339
Ireland, Climate and health resorts of (J. A. Lindsay) - 83
Italian Mediterranean sea-coast (Michael Foster) - 119

J.

PAGE

JOHNSTON-LAVIS, H. J.: Vittel - - - - - - - 143
JONES, ROBT.: How to secure mental health - - - - - 229
JOWERS, REGINALD F.: Pneumococcal peritonitis (a case with comments) - 462

K.

Kidney, Neoplasm of (a case with comments) (R. Parnell and R. Gompertz) 737

L.

LANE, J. ERNEST: Review on venereal diseases - - - - - 549
Laryngitis tuberculous, Treatment of dysphagia in - - - - - 741
LATHAM, ARTHUR: Treatment of pulmonary tuberculosis - - - - 21
Leaders in Modern Medicine (Sir Wm. Broadbent) (illustrated) - - 329
LINDSAY, J. A.: Climate and health resorts of Ireland - - - 83
LISHMAN, F.: The Canaries with especial reference to Teneriffe - - 190
Locomotor ataxia, Diagnosis of - - - - - - - - 486
Long bone fractures, End-to-end apposition in (illustrated) (H. Tyrrell Gray) 533
LUFF, ARTHUR P.: English spas considered therapeutically - - 60

M.

MACDONALD, GREVILLE: Climate and the nose - - - - - 28
MACKAY, DUNCAN M.: General practitioner and deaf-mutism - - 586
MACKENZIE, JAMES: The Spa treatment of heart affections - - - - 34
——, J. A.: Fracture of metacarpal bones (illustrated) - - - 517
——, L. H. L.: Gastric ulcer - - - - - - - - 669
MACPHAIL, ANDREW: Health resorts in Canada - - - - - 181
McGAVIN, LAWRIE: Malignant obstruction of the œsophagus - - 353
——, ——, The radical cure of complete procidentia of uterus (illustrated) - 804

PAGE

Mastitis, Bier's method in (A. W. Wakefield) 852
Measles, Condition of gums in (Frank E. Tylecote) 326
Meat, Imported 751
Medical education 479
—— inspection of school children (illustrated) (Ralph P. Williams) 725
Ménière's disease, Treatment of, by lumbar puncture 602
Mental breakdown 346
Mental health, How to secure (Robert Jones) 229
Metacarpal bones, Fracture of (illustrated) (J. A. Mackenzie) 517
Midland Counties, Health of (P. Horton-Smith Hartley) 46
Milk, Contaminated 481
—— supply of London 875
Mockery and credulity 209
Modern Medicine, Leaders in (Sir Wm. Broadbent) (illustrated) 329
Moore, F. Craven: Recent work on the stomach 711
—— ——: Striæ atrophicæ as a sequel of acute pneumonia (illustrated) 397
Mortality, Occupational 617
Moynihan, B. G. A.: Cholelithiasis its early recognition and treatment 830
Murray, C. M.: Health and travel in South Africa 205

N.

Nash, J. T. C.: East coast climate 56
Neoplasm of the kidney (a case with comments) (R. Parnell and R. Gompertz) 737
Nephritis due to impetigo 465
Nerve disassociation 299
Nervous system, Recent literature on diseases of (H. Campbell Thomson) 295
Neuralgia trigeminal, Treatment of 563
Neurological literature, Review of (Wilfred Harris) 556
Neuron theory 561
Nose, Climate and the (Greville Macdonald) 28
Notes by the Way: 212, 343, 479, 614, 750, 873; *Our New Building*, 212; *The Special Number*, 212; *The Research Defence Society*, 343; *The Case for Vivisection*, 343; *The Charge of Cruelty*, 344; *Tuberculosis in Ireland*, 345; *The Need for Legislation*, 345; *Mental Breakdown*, 346; *Medical Education*, 479; *Preliminary Science*, 479; *Provincial Competition*, 480; *Contaminated Milk*, 481; *Leaflets*, 481; *The Registration of Nurses*, 482; *Opening of the Medical Sessions*, 614; *The Advantages of the Modern Student*, 615; *The Feeble-Minded*, 615; *The Proposal of the Royal Commission*, 616; *Occupational Mortality*, 617; *Dangerous Trades*, 618; *The Notification of Tuberculosis*, 750; *Imported Meat*, 751; *The Cholera in Russia*, 752; *Infanticide*, 752; *Educative Imprisonment*, 753; *Holidays*, 754; *To Our Contributors and Readers*, 873; *Tuberculous Butter*, 873; *Notification of Tuberculosis*, 874; *Sanatorium Treatment*, 875; *Climate*, 875; *London Milk Supply*, 876.
Notes from Foreign Journals: 336, 465, 600, 741, 868; *Treatment of Hyperidrosis by Formol*, 336; *A Surgical Soap*, 336; *Viscum Album in Treatment of Tubercular Hæmoptysis*, 337; *Spasm of Anus causing crying in an Infant*, 337; *The Active Agent in Treatment by Arsenic*, 337; *A Castor Oil Prescription*, 338; *Duodenal Dyspepsia*, 338; *Treatment of Intestinal Hæmorrhages by Hot Enemata of Gelatine*, 339; *Treatment of Oxyuris Vermicularis*, 465; *Nephritis due to Impetigo*, 465; *Treatment of Epilepsy*,

PAGE

466; *Destruction of Flies by Formol*, 466; *Croup and Morphia*, 467; *A Dental Soap*, 467; *Treatment of Eclampsia*, 468; *Application of Ice over the Heart*, 469; *Treatment of Sore Throats*, 470; *Treatment of Syphilis*, 471; *New Method of Inhaling Mercury in the Treatment of Syphilis*, 472; *Therapeutic Use of White Bole*, 472; *Asthma, Dyspnœa, and Stomach Cough*, 600; *Camptodactylia*, 600; *The Painful Abdominal Crises in Henoch's Purpura*, 601; *Treatment of Ménière's Disease by Lumbar Puncture*, 602; *Two Symptoms in Hemiplegia*, 603; *Arsenic in Anœmia*, 603; *Treatment of Dysphagia in Tuberculous Laryngitis*, 741; *Phosphergot*, 742; *Septic Gastritis due to Oral Sepsis*, 744; *Vulvar Vegetations in Pregnancy*, 745; *Abortive Treatment of Acute Otitis Media*, 868; *Hydrate of Amylene in Eclampsia*, 868; *The Purgative Properties of Phenolphthalein*, 869; *Treatment of Fracture of the Olecranon*, 869; *Treatment of Diphtheritic Paralysis with Antitoxin*, 870.
Notes, Practical. *See* Practical Notes.
Nurses, Registration of - - - - - - - - - 483

O.

Œsophagus, Malignant obstruction of (Lawrie McGavin) - - - - 353
Olecranon, Treatment of fracture of - - - - - - - - 869
Organic saline treatment - - - - - - - - - 27
ORMOND, ARTHUR W.: Treatment of trachoma - - - - - 286
Otitis media, Abortive treatment of acute - - - - - - 868
Oxyuris vermicularis, Treatment of - - - - - - - - 465

P.

Pancreas, Surgery of - - - - - - - - - - 451
Pancreatitis, C-reaction for diagnosis of - - - - - - 483
Paralysis, diphtheritic, Treatment of, with antitoxin - - - - 870
——, Hysterical - - - - - - - - - - 380
——, Infantile (G. F. Still) - - - - - - - - 709
PARNELL, R., and R. GOMPERTZ: Neoplasm of the kidney - - - 737
Patella, Fracture and refracture of (illustrated) (Edred M. Corner) - - 498
Pericarditis, suppurative, and empyema in children (G. F. Still) - - 704
Pericardium adherent (W. J. Fenton) - - - - - - 637
Peritonitis pneumococcal. A case with comments (R. F. Jowers) - - 462
—— puerperal, Abdominal or vaginal section for - - - - - 315
Pernicious anæmia, Symptoms and condition of blood in (J. George Taylor) 320
Phenolphthalein, Purgative properties of - - - - - - 869
Phosphergot - - - - - - - - - - - 742
PLAYFAIR, HUGH: Some recent work in gynæcology - - - - 273

PAGE

Plumbism 383

Pneumonia, acute, Striæ atrophicæ as a sequel of (illustrated) (F. Craven Moore) 397

——, Cardiac failure in 487

—— and pneumococcal infections in children (G. F. Still) 702

Poliomyelitis, Acute 295

Practical Notes: 347, 483, 619, 755, 877; *Raynaud's Disease*, 347; *Treatment of Raynaud's Disease*, 348; *Freckles*, 348; *Treatment of Freckles*, 349; *Cammidge's C-reaction for the Diagnosis of Pancreatitis, etc.*, 483; *The Estimation of Sugar in the Urine*, 484; *Latent Gonorrhœa in the Female*, 485; *Intravenous Injections*, 485; *Diagnosis of Locomotor Ataxia*, 486; *Cardiac Failure in Pneumonia*, 487; *A Ruptured Tubal Pregnancy*, 619; *Examination of Puncture Fluids*, 619; *Sterilisation of a Test Tube*, 623; *Angular Conjunctivitis*, 755; *Foreign Bodies in the Nose*, 756; *Foreign Bodies in the Ear*, 757; *Foreign Bodies in the Conjunctival Sac, the Cornea, and Sclera*, 757; *Pruritus Ani*, 758; *Normal Saline Infusion and Chloroform*, 759; *Coccygodynia*, 877; *Picric Acid in Cervical Erosions*, 878; *Veratrum Viride in Puerperal Eclampsia*, 879.

Pregnancy, Pyelitis during (H. T. Hicks) 419

——, Vulvar vegetations in 745

Preparations, Inventions, etc.: 350, 488, 624, 760, 880; "*Tabloid*" *Phenol and Menthol Compounds*, 350; *Schering's Synthetic Camphor*, 350; *Christia Accouchement Sheet*, 350; *Membroids*, 351; *Analgesic Balm*, 351; *Gelatin-coated Pills, Aloin and Phenolphthalein Compound*, 351; *Hemisine*, 352; *Mattoni Giesshubler*, 352; *Cyllin Obstetrical Lubricant*, 488; *New Packing for "Kepler" Malt Products*, 488; *Coryfin*, 488; *A New Portable Illuminative Attachment for the Ophthalmoscope*, 624; *New "Tabloid" Hypodermic Preparations*, 624; *Arsacetin and Sabromin*, 760; *Silcool*, 760; *Guaiacose*, 880; *Arylarsonates*, 880.

Preventorium, The evolution of the (William Ewart) 24

Procidentia of uterus, Radical cure of complete (illustrated) (Lawrie McGavin) 804

Pruritus ani 758

Puerperal eclampsia, Veratrum viride in 879

—— peritonitis, Abdominal or vaginal section for 315

—— sepsis, Major operations in treatment of (F. E. Taylor) 304

Pulmonary tuberculosis, Treatment of (Arthur Latham) 21

—— ——, Home treatment and nursing of, in Dublin (Sir Wm. J. Thompson) 625

Puncture fluids, Examination of 619

Pyelitis during pregnancy (H. T. Hicks) 419

R.

Rawling, Louis B.: Surgical treatment of incompletely descended testis 250

Raynaud's disease 347

—— ——, Treatment of 348

Reboul, A. E. E.: Châtel-Guyon 140

Renal spas (France): Leonard Williams 130

Rendall, Stanley: Aix-les-Bains 146

Research Defence Society 343

Respiratory catarrhs, Ems treatment of (Albert Vogler) 31

PAGE

Reviews of Books: 340, 473, 605, 746, 871; *Alcohol and the Human Body: An Introduction to the Study of the Subject* (Sir Victor Horsley and Mary D. Sturge), 340; *A Text Book of Pathology* (Francis Delafield and T. Mitchell Prudden), 340; *Text Book of Ophthalmology* (Ernst Fuchs), 341; *Hernia; its Etiology, Symptoms, and Treatment* (W. McAdam Eccles), 341; "*First Aid" to the Injured and Sick: An Advanced Ambulance Handbook* (F. J. Warwick and A. C. Tunstall), 342; *Aids to Surgery* (Joseph Cunning), 342; *A Manual for Hospital Nurses and others engaged in attending on the Sick* (E. J. Domville), 342; *The Borderland of Epilepsy* (Sir W. R. Gowers), 473; *Handbook of Medical Jurisprudence and Toxicology* (Wm. A. Brend), 473; *Prostatic Enlargement* (Cuthbert S. Wallace and L. S. Dudgeon), 474; *Bilharziosis* (F. Cole Madden), 474; *Cancer of the Stomach* (A. W. Mayo Robson), 475; *Surgical Emergencies* (Percy Sargent), 475; *Surgery: Its Principles and Practice* (Ed. Wm. W. Keen), 475; *A Manual of prescribing for Students and Practitioners of Medicine* (C. R. Marshall), 476; *On Treatment* (Harry Campbell), 476; *Diseases of the Male Generative Organs* (E. M. Corner), 477; *An Essay upon Disease: Its Causes and Prevention* (G. E. Richmond), 477; *Preventable Blindness* (N. Bishop Harman), 478; *Squint and Ocular Paralysis* (E. Lucas Hughes), 478; *Diseases of the Larynx* (Harold Barwell), 478; *Lessons in Disinfection and Sanitation* (F. W. Andrews), 605; *The Bacteriological Examination of Water Supplies* (W. G. Savage), 605; *Rational and Effective Treatment of Hip Disease* (P. Bruce Bennie and Alex. B. Bennie), 605; *Pelvic Inflammation in the Female* (Thomas Wilson), 606; *Metabolism and Practical Medicine* (Carl von Noorden), (Edited by I. Walker Hall), 606; *Elements of Physics: For Medical Students* (F. J. M. Page), 607; *The Opsonic Method of Treatment* (R. W. Allen), 607; *The Technique of Vagino-Peritoneal Operations* (E. Wertheim and H. Micholitsch, Trans. by C. Lockyer), 607; *Confessio Medici* (Writer of *The Young People*), 608; *Wintering in Rome* (A, G. Welsford), 609; *Proceedings of Royal Society of Medicine*, 609; *Transactions of American Laryngological Association*, 610; *Physical Methods in Treatment of Heart Disease* (Arthur C. Dampier-Bennett), 610; *The Operations of General Practice* (Edred M. Corner and H. Irving Pinches), 611; *Diseases of the Ear* (Hunter Tod), 611; *Diseases of the Nose* (Ernest B. Waggett), 612; *Rotunda Midwifery for Nurses and Midwives* (G. T. Wrench), 612; *A Laboratory Handbook of Bacteriology* (Rudolph Abel. Trans. by M. H. Gordon), 612; *Practical Anæsthetics* (H. E. G. Boyle), 613; *Rotunda Practical Midwifery* (E. H. Tweedy and G. T. Wrench), 613; *A Manual of Venereal Diseases* (Officers of R. A. M. C.), 746; *Syphilis in the Army* (Major H. C. French), 746; *The Experimental Prophylaxis of Syphilis* (Paul Maisonneuve, Translation and Introduction by F. L. Derteuil), 747; *Syphilis of the Spinal Cord* (Prof. Gilbert and Dr. Lion), 747; *Abdominal Tuberculosis* (A. E. Maylard), 738; *Treatment by Hypnotism and Suggestion; or Psycho-Therapeutics* (C. L. Tuckey, Introduction by Sir F. R. Cruise), 748; *A Simple Method of Water Analysis especially designed for the Use of Medical Officers of Health* (J. C. Thresh), 749; *The Immediate Care of the Injured* (A. S. Morrow), 749; *The Edinburgh Stereoscopic Atlas of Obstetrics* (G. F. Barbour Simpson and Edward Burnet), 871; *Injuries of Nerves and their Treatment* (James Sherren), 871; *Handbook of Surgery* (G. B. Buchanan), 871; *The Major Symptoms of Hysteria* (Pierre Janet), 871; *The Practical Medicine Series* (Ed. Gustavus P. Head), 872; *Diets in Tuberculosis* (N. D. Bardswell and J. E. Chapman), 872.

Rheumatism in childhood (G. F. Still) - - - - - - 707

Rheumatoid arthritis, Bier's method in (A. W. Wakefield) - - - 654

Rigby, Hugh M.: Review of 46 operations for cholecystitis - - - 819

Rosenau, Albert: Kissingen - - - - - - - - 166

Rowlands, R. P.: Treatment of wryneck by lengthening sterno-mastoid - 401

S.

PAGE

Sabromin and Arsacetin - 760
Saline infusion, Normal, and chloroform - 759
—— treatment, Organic - 27
—— —— of scrofulous lesions (G. S. F. Engelmann) - 26
Sanatorium treatment - 874
School children, Medical inspection of (Ralph P. Williams) - 725
Scotland, Climate and health resorts of (F. J. Chatteris) - 73
SCOTT, ALEXANDER: Industrial diseases - 837
Scrofulous lesions, Saline treatment of (G. S. F. Englemann) - 26
Sepsis, Bier's method in (A. W. Wakefield) - 846
Septic gastritis due to oral sepsis - 744
Silcool - 760
Soap, Dental - 467
South coasts, Climate and health resorts of (A. G. R. Foulerton) - 50
Spa treatment of heart affections (James Mackenzie) - 34
STEPHENS, G. ARBOUR: Colour vision and its relation to other senses (illustrated) - 540
Sterilisation of test tube - 623
STILL, G. F.: Recent work in diseases of children - 702
Stomach, Functional or organic disease of - 385
——, Recent work on (F. Craven Moore) - 711
—— cough, asthma, and dyspnœa - 600
Striæ atrophicæ as a sequel of acute pneumonia (illustrated) (F. Craven Moore) - 397
Striations, Tree-branch, seen in tuberculous lungs (illustrated) (C. Willett-Cunnington) - 861
Surgery, Recent advances in (Joseph Cunning) - 426
——, abdominal, Recent work in (Harold Upcott) - 438
Surgical soap - 336
Syphilis, Treatment of - 471, 472
——, ——, by atoxyl - 549
——, ——, by injections of grey oil - 551
Syphilitic subjects, Marriage of - 554

T.

TAYLOR, FRANK E.: Major operations in treatment of puerperal sepsis - 304
——, J. GEO.: Symptoms and condition of blood in pernicious anæmia - 320
Tertium quid - 210
Testis incompletely descended, Surgical treatment of (L. B. Rawling) - 250
THOMPSON, SIR WM. J.: Home treatment and nursing of pulmonary tuberculosis in Dublin - 625
THOMSON, H. CAMPBELL: Review of recent literature on diseases of nervous system - 295
Throats, Treatment of sore - 470
Thrombosed pelvic veins, Ligature of - 308
TIRARD, NESTOR: Infective or ulcerative endocarditis - 629
Trachoma, Treatment of (Arthur W. Ormerod) - 286
Tubercle bacillus, Recent advances against (Frank C. Eve) - 406
—— and mixed infections, Bier's method in (A. W. Wakefield) - 660
Tubercular hæmoptysis, Treatment of, by viscum album - 337
Tuberculosis in Ireland - 345

PAGE
Tuberculosis, Notification of - - - - - - - - 750, 873
——, Treatment of pulmonary (Arthur W. Latham) - - - - 21
——, pulmonary, Home treatment and nursing of, in Dublin (Sir Wm. J. Thompson) - - - - - - - - - - - 625
Tuberculous butter - - - - - - - - - - 873
—— laryngitis, Treatment of dysphagia in - - - - - - 741
—— lungs, Tree-branch striations seen in (illustrated) (C. Willett-Cunnington) - - - - - - - - - - 861
Tumour intracranial, Doubtful cases of - - - - - - 375
Tumours, Phantom - - - - - - - - - - 380
Turner, J. G.: Review of dental surgery - - - - - - 857
—— Wm.: Gibraltar, Algeciras, and Ronda - - - - - 107
Tylecote, Frank E.: Condition of gums in measles - - - 326

U.

Ulcer, Gastric (L. H. L. Mackenzie) - - - - - - - 669
Upcott, Harold: Recent work in abdominal surgery - - - 438
Urine, Estimation of sugar in - - - - - - - 484
Uterus, Radical cure of complete procidentia of (illustrated) (Lawrie McGavin) - - - - - - - - - 804

V

Venereal diseases, Review on (J. Ernest Lane) - - - - - 549
Veratrum viride in puerperal eclampsia - - - - - - 879
Vision colour and relation to other senses (illustrated) (G. Arbour Stephens) - - - - - - - - - - 540
Vivisection, The case for - - - - - - - - 343
Vogler, Albert: Ems treatment of respiratory catarrhs - - - 31
——, ——: Alkaline waters (Ems) - - - - - - 159
Vulvar vegetations in pregnancy - - - - - - - 745

W.

Wakefield, A. W.: Account of Bier's method of passive congestion 566, 654, 846
Weber, Sir Hermann: Climates suitable for the aged - - - - 1
——, F. Parkes: Change of air in young, adult, and early middle life - 16
Weintraud, Professor W.: Treatment of gout - - - - - 39
White bole, Therapeutic use of - - - - - - - - 472
Willett-Cunnington, C.: Tree-branch striations seen in tuberculous lungs (illustrated) - - - - - - - - - - - 861

PAGE
WILLIAMS, LEONARD: Some renal spas (France) - - - - - 130
——, RALPH P.: Medical inspection of children (illustrated) - - 725
——, W.: Llandrindod - - - - - - - - - 71
Wryneck, Treatment of (R. P. Rowlands) - - - - - - 401
WYBAUW, R.: Belgium spa - - - - - - - - 154

Z.

Zander method of treatment (Gustav Hamel) - - - - 44

◆

ILLUSTRATIONS.

Sir William Broadbent, portrait; Plate I., facing p. 329.
Striæ atrophicæ as a sequel of acute pneumonia; Plate II., facing p. 397.
Treatment of wryneck by lengthening sterno-mastoid; Plate III., facing p. 404; Figures 2.
Fracture and refracture of patella; Plates IV. and V., facing pp. 502 and 503; Figures 9.
Fracture of metacarpal bones; Plates VI.-XX., facing pp. 518–532; Figures 15.
End-to-end apposition in fractures of long bones; Plates XXI., XXII., facing pp. 536 and 537; Figures 4.
Colour vision, pp. 544–546.
Medical inspection of school children; Figures 3.
Two cases of multiple congenital deformities; Plates XXIII., XXIV., facing pp. 762 and 763: Figures 6.
Radical cure of complete procidentia of uterus, p. 804; Figures 5.
Tree-branch striations seen in skiagrams of tuberculous lungs; Plate XXV., facing p. 861.

S.

PAGE

Sabromin and Arsacetin - 760
Saline infusion, Normal, and chloroform - 759
—— treatment, Organic - 27
—— —— of scrofulous lesions (G. S. F. Engelmann) - 26
Sanatorium treatment - 874
School children, Medical inspection of (Ralph P. Williams) - 725
Scotland, Climate and health resorts of (F. J. Chatteris) - 73
SCOTT, ALEXANDER: Industrial diseases - 837
Scrofulous lesions, Saline treatment of (G. S. F. Englemann) - 26
Sepsis, Bier's method in (A. W. Wakefield) - 846
Septic gastritis due to oral sepsis - 744
Silcool - 760
Soap, Dental - 467
South coasts, Climate and health resorts of (A. G. R. Foulerton) - 50
Spa treatment of heart affections (James Mackenzie) - 34
STEPHENS, G. ARBOUR: Colour vision and its relation to other senses (illustrated) - 540
Sterilisation of test tube - 623
STILL, G. F.: Recent work in diseases of children - 702
Stomach, Functional or organic disease of - 385
——, Recent work on (F. Craven Moore) - 711
—— cough, asthma, and dyspnœa - 600
Striæ atrophicæ as a sequel of acute pneumonia (illustrated) (F. Craven Moore) - 397
Striations, Tree-branch, seen in tuberculous lungs (illustrated) (C. Willett-Cunnington) - 861
Surgery, Recent advances in (Joseph Cunning) - 426
——, abdominal, Recent work in (Harold Upcott) - 438
Surgical soap - 336
Syphilis, Treatment of - 471, 472
——, ——, by atoxyl - 549
——, ——, by injections of grey oil - 551
Syphilitic subjects, Marriage of - 554

T.

TAYLOR, FRANK E.: Major operations in treatment of puerperal sepsis - 304
——, J. GEO.: Symptoms and condition of blood in pernicious anæmia - 320
Tertium quid - 210
Testis incompletely descended, Surgical treatment of (L. B. Rawling) - 250
THOMPSON, SIR WM. J.: Home treatment and nursing of pulmonary tuberculosis in Dublin - 625
THOMSON, H. CAMPBELL: Review of recent literature on diseases of nervous system - 295
Throats, Treatment of sore - 470
Thrombosed pelvic veins, Ligature of - 308
TIRARD, NESTOR: Infective or ulcerative endocarditis - 629
Trachoma, Treatment of (Arthur W. Ormerod) - 286
Tubercle bacillus, Recent advances against (Frank C. Eve) - 406
—— and mixed infections, Bier's method in (A. W. Wakefield) - 660
Tubercular hæmoptysis, Treatment of, by viscum album - 337
Tuberculosis in Ireland - 345

410

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